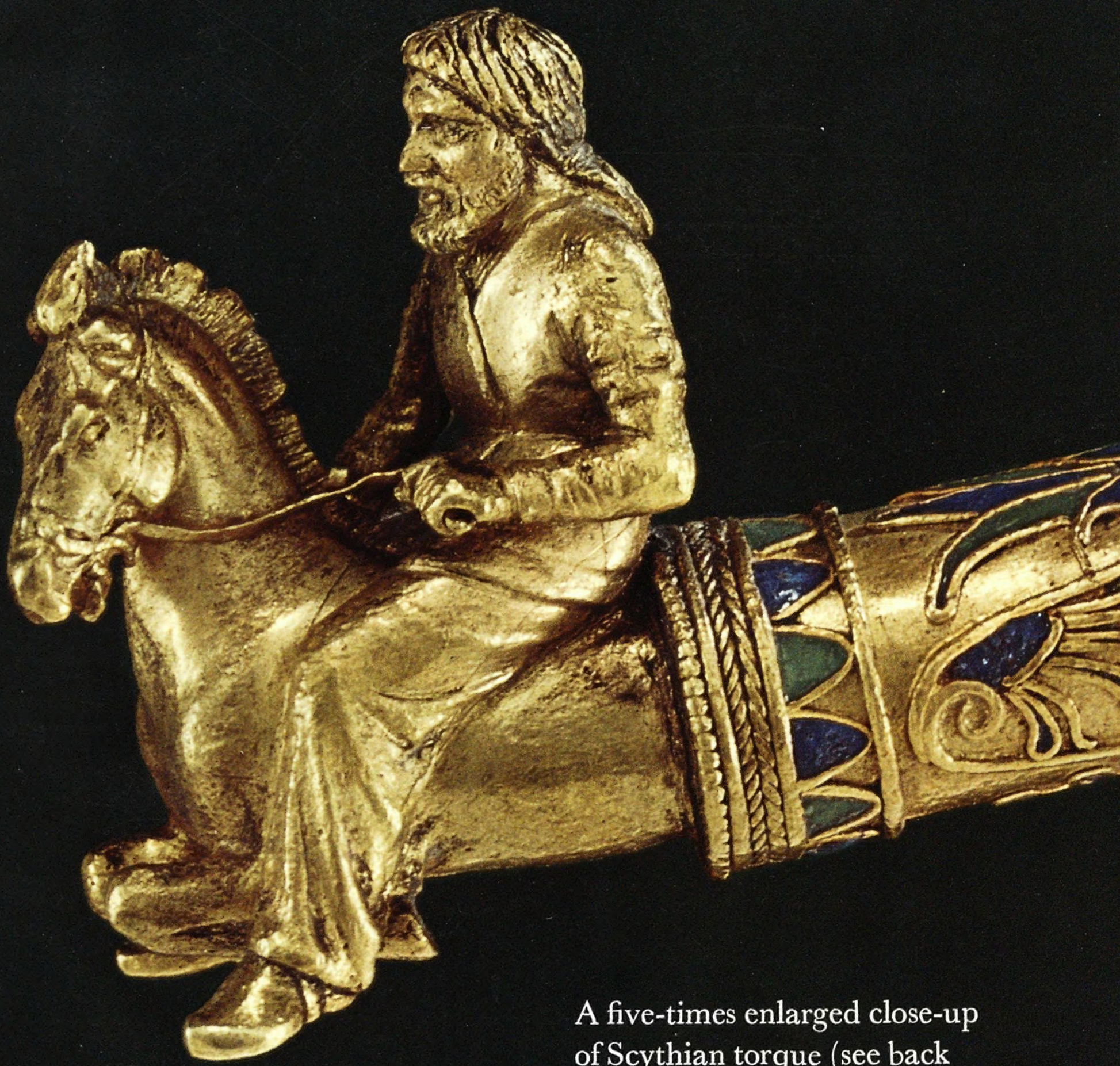
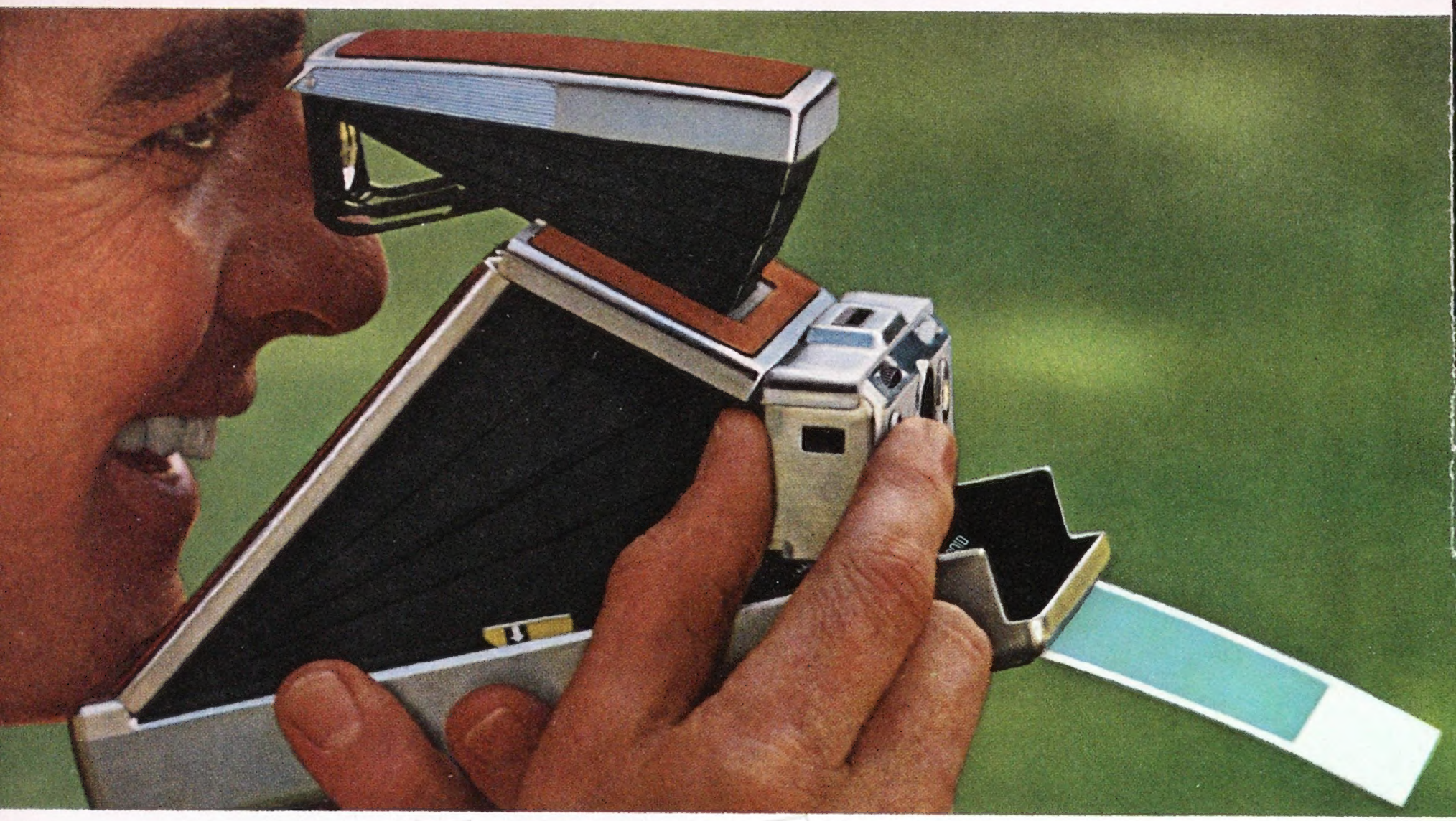
April 1975

Smithsonian



A five-times enlarged close-up of Scythian torque (see back cover and p. 2) in dazzling U.S. show of goldwork from USSR

Polaroid's SX-70. It



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April 1975

Smithsonian

Volume 6, Number 1

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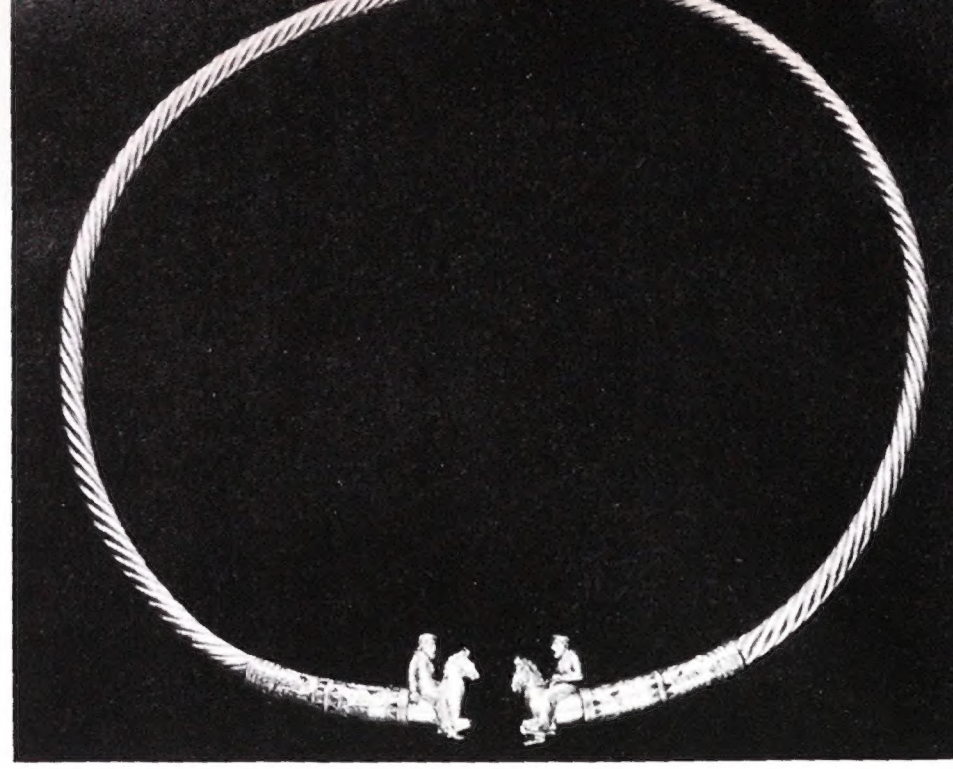

COVER: Enlarged details of a ten-inch torque (above) in exhibition of Scythian treasures from the USSR, opening this month at the Metropolitan Museum (p. 28) Photograph by Lee Boltin

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The 200-year-old child.

Bring Her Back To Her Birthplace.

Every American kid is the product of 200 years of a revolutionary experiment in life, liberty and the pursuit of happiness.

But now, as never before in our history, this concept is being questioned both at home and abroad.

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And may even help save it.

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The view from the castle

Scientists find that many seabird species are, like porpoises, subject to inadvertent destruction by commercial fishermen

In his book, *The Sea Has Wings* (1973), Franklin Russell quotes an unknown poet's elegy on seabirds written in the ninth century: "The gannet's clamor, or the seafowls' loudness was for me laughter. . . ." I, too, have had the daunting thrill of teetering on the great cliffs of Bonaventure Island, watching the murres and gannets and kittiwake gulls dip and turn and twist in a ferocious wind to land expertly on wet rocks.

Russell's book closes with a premonitory ring: "There are disturbing reports from the North Atlantic of recent and catastrophic population crashes, particularly on the Scottish island of St. Kilda . . . and on the north shore of the Gulf of Saint Lawrence . . . where puffins and razorbilled auks have declined" mysteriously. He suspects toxic chemicals, but there is a new man-made threat.

Fifteen years ago the Danes discovered vast shoals of wintering subadult Atlantic salmon in the Davis Strait and Labrador Sea areas off west Greenland. By 1965 they commenced an offshore driftnet fishery, and by 1969 they were marketing in excess of 2,000 metric tons of salmon. Groups of associations formed up on both sides of the ocean to protest this destructive exploitation of the Atlantic salmon's wintering grounds. The Danish government conscientiously agreed to limit fishing to a short season, curtailing the operations progressively so that by 1976 an offshore catch of only 1,100 tons annually will be permitted. Whether this will solve the fishing problem, time will tell.

But no one noticed something else until four years ago, when a group of Canadian biologists found that the driftnets were accidentally catching about 500,000 murres each season, as the International Council for Bird Preservation estimated in 1971. The extra 500,000 deaths from the driftnets added to losses from natural causes, oil pollution and hunting in Greenland and Newfoundland, had turned the balance and started the gradual erosion of the species. Had this continued, it would have put an effective end to the role of the thick-billed murres in the North Atlantic marine ecology. So as a by-product of the protests by vested-interest land-based fishermen, a bird species may be saved.

Meanwhile auks, puffins, and guillemots—all relatives—continue to show a decline in observed numbers in the Atlantic, and now a new threat has appeared in the Pacific. Gerald Sanger, a wildlife biologist of the National Marine Fisheries Service, has discovered that the Japanese salmon driftnet operations catch vast quantities of seabirds accidentally. By counting birds drowned in the nets from sample cruises on which Sanger and others have shipped, it is possible to estimate that an average of close to 500,000 birds are killed yearly. Murres form the largest number killed, but shearwaters, puffins and fulmars are included, as well as small auks, albatrosses and petrels. The number of breeding seabird pairs of these species is unknown but urgent further study is called for.

Perhaps we need an international commission on seabirds, such as the present whaling commission. There must be some way of exploiting the oceans without heedlessly destroying nature's diversity—or must we echo the ancient poet: "There I heard naught save the harsh sea and ice-cold wave. . . ."

S. Dillon Ripley

SEVEN LUXURY FEATURES THOUGHTFULLY LEFT OFF THE VOLVO 164.

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3 NO 400 CUBIC INCH V-8 Volvo's 3-litre six has enough "go" for any well-balanced person. And enough economy—22 mpg on the highway.* Volvo's computerized fuel injection has electronic sensors that monitor speed, altitude and temperature to determine proper fuel mixture.

*U.S. Gov't. EPA figures, 9/74

4 NO FAKE WOOD VENEER Volvo covers its dashboard with instrumentation. A tachometer, trip mileage indicator and electric clock are standard. There's even a light that warns if an important light goes out.

5 NO STATUS HOOD ORNAMENT The Volvo driver doesn't require constant reassurance. Nor does he need to be reminded what car he's driving. Unlike other cars today, the 164 isn't a copy of anything.

6 NO DECALED-ON PIN STRIPING Volvo concentrates on what's under the paint. 8,000 spot welds fight rattles. The metal is magnetically charged to soak up rustproofing. There are two separate coats of undercoating.

7 NO LONG OPTIONS LIST Instead, the 164 provides a long standards list. Air conditioning, automatic transmission, power-assisted steering, power front windows, 4-wheel power disc brakes and steel belted radial whitewalls.

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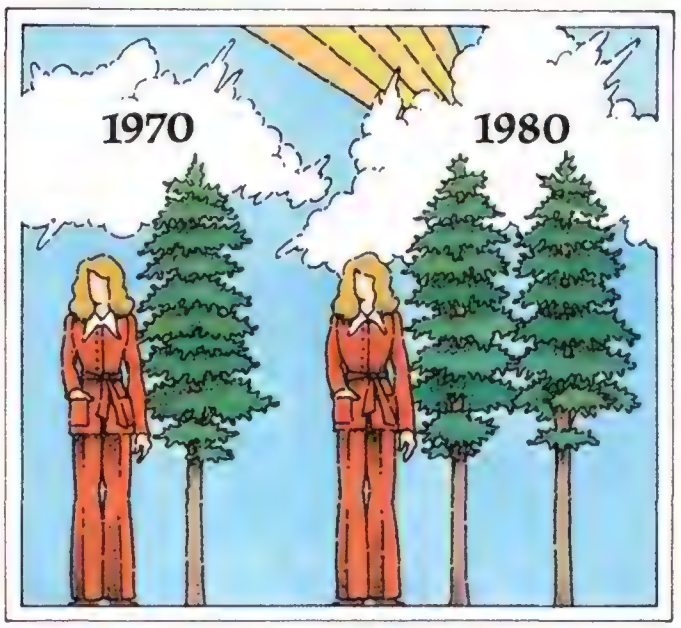

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At International Paper, we believe forest products companies, private landowners and government should work together to develop more constructive policies for managing America's forests. The wrong policies can make tree farming impossible and force the sale of forest land for other purposes. The right policies can assure continuation of America's forest resources.

If you'd like more information about what has to be done to assure the world's fiber supply, write to: International Paper Company, Department 106-A, 220 East 42nd Street, New York, N.Y. 10017.

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Letters to the Editor

The new alchemy

Dear Sir: The people involved in The New Alchemy Institute on Cape Cod, described in your February issue, need some common-sense advice.

I am a practical farmer and do fairly well at it. If I spent as much money as those silly people with so little result, the bank would stop in some day and tell me to take a little trip someplace—anywhere, as long as it was not in their neighborhood—and let someone else run the farm.

In any case, these 12 people better develop a taste for fish raised on human sewage, along with an occasional wormy cabbage.

W. Harold Graybeal
Peach Bottom, Pennsylvania

Dear Sir: Your description of the new alchemists impresses me as a beautiful approach to man's interface problems with nature. In fact, I'm tempted to quit my job and join them. I am a mechanical engineer who is tired of being part of the problem; from now on I want to be part of the solution.

R. Lee Hatcher
Fremont, California

Dear Sir: We wish to correct your description of a windmill with "dacron sails." "Dacron" is Du Pont's trademark for its polyester fiber. As such it should be used only in conjunction with the correct generic—"polyester fiber"—and should not be applied to fabrics, garments, sails or ships, cabbages or kings.

James Adshead jr.
E.I. du Pont de Nemours & Company
Wilmington, Delaware

Dear Sir: Your article on the alchemists is fascinating, informative and timely—especially now that so many people are becoming concerned with how each of us can contribute our own share to the support of humanity already existing on this globe. If we can do this in the way of ancient man, by learning how to adapt ourselves to the environment, instead of through wholesale adaptation of the environment to us, I believe that the long-term prognosis for the human race will be vastly improved.

I would very much like to help support the work of The New Alchemy Institute. The article indicates that the Institute does have memberships and that it publishes a journal, but it fails to give the full address.

Karl H. Schwerin
The University of New Mexico
Albuquerque, New Mexico

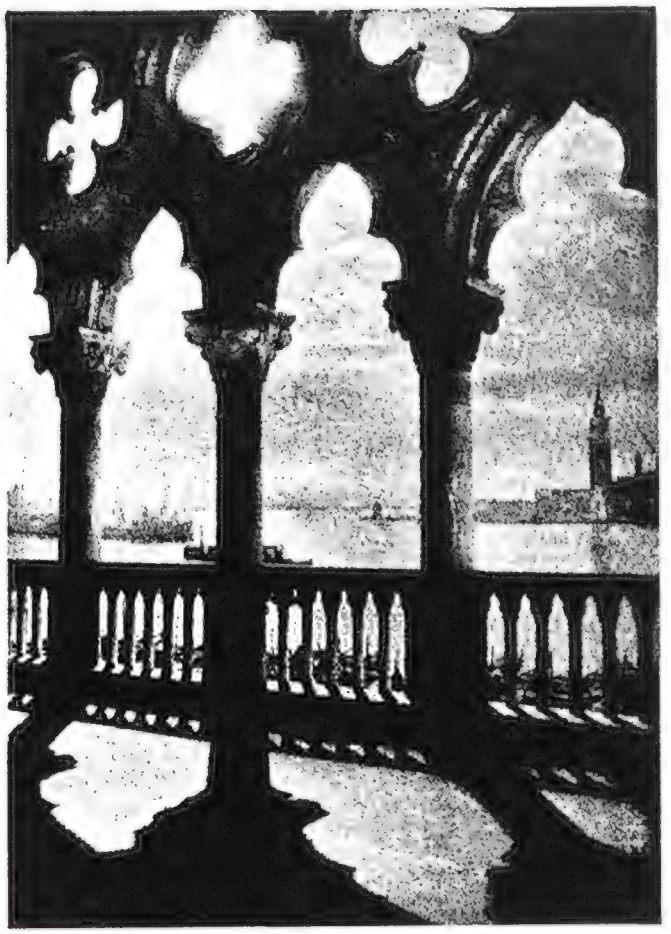
For Professor Schwerin and others who have requested the address, it is: The New Alchemy Institute-East, Box 432, Woods Hole, Massachusetts 02543. Ed.

Seed catalogs

Dear Sir: In your article, "Ah, the old-time seed catalogs!," there was a mention of the Georgia farmer who won a prize in the 1890s for a 111-pound watermelon. That is nothing to what is going on in Hope, Arkansas, today.

Nedra and Lester Kent [below], on a 200-acre farm, routinely raise watermelons weighing more than 100 pounds.

They have standing orders from all over the world for these "party melons"



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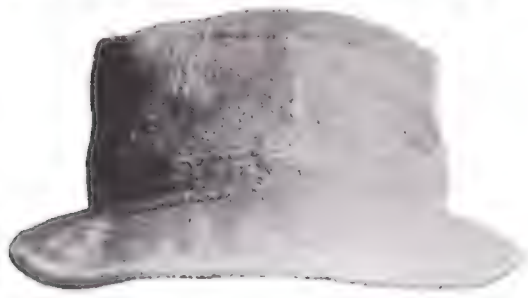

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and they have shipped them by every conceivable method of transportation from truck to helicopter. Once they had a load of 17 melons that, together, weighed more than a ton. Bob Hope auctioned off one of the Kent melons in 1969 for the benefit of the victims of Hurricane Camille and raised $8,000. Gifts of large melons have been sent to prominent people—one given to President Nixon weighed 153 pounds.

The all-time record for melons grown in the Hope area is for one produced in 1935 that weighed 195 pounds. Now, working with seeds that are descendants of that big one, Lester Kent is hoping to raise one that will weigh at least 200 pounds. If he succeeds, it should be ripe just in time for the centennial celebration of the town of Hope.

Bethany Strong
Amherst, Massachusetts

Nazi art

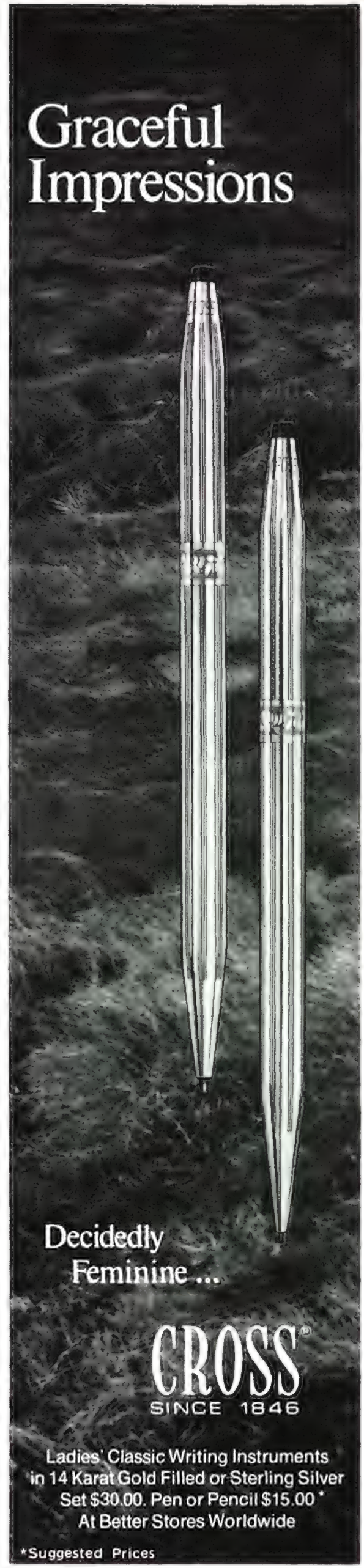
Dear Sir: Rudolph Chelminski's article on Nazi art is totally repugnant to me. Our American troops, who broke the back of the Nazi army, vomited when they saw the death camps where some 6.5 million—Jews and non-Jews—were exterminated. They still hear their cries, see their broken, despoiled bodies in their dreams, even today. Just why did you allow publication of this article?

Mervin N. Levey
Toledo, Ohio

The art show is a part of history and well within the SMITHSONIAN *mandate. The director of the art show, Dr. Georg Bussmann, made clear his intention in the following quotes, which appeared in the article: "The reason for this show is to bring back an idea of what life was then. . . . People tend to forget. We want to make them understand what fascism was and make it impossible for it to return. . . ." Each piece of art carried detailed "rebuttals" consisting of statistics of Nazi atrocities and other critical commentary.* Ed.

The view from the castle

Dear Sir: On behalf of the zoos of the world, their staffs, their charges and their supporters, I wish to say a word of thanks to Secretary Ripley for his support of our functions, priorities and goals, as expressed in "The view from the castle."



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Stuart M. Fullerton
Jacksonville Zoological Society & Park
Jacksonville, Florida

Dear Sir: While it is certainly true that the preservation of the California condor and other endangered species is an invaluable service, it is also true that the majority of zoo functions are not directed to this purpose. There are just too many animals being held in captivity simply for people to gawk at.

There is an appalling lack of feeling for zoo animals, as evidenced by their confinement in sharply restricted quarters. So, I say preservation yes; all the rest of it can go.
Frank Mazza
Rochester, New York
Mr. Ripley's message was directed toward preservation. Ed.

Phenomena, comment and notes

Dear Sir: If the gentlemen of Harvard should wish to extend their inquiry beyond determining at what point mice and dogs break out of a trot into a gallop, they might address their research to the horse. A group of very practical men would be most interested. For example, trainers of harness horses—each hoping for a new Dan Patch—would soon have their charges on the scales (between metabolism tests), with odds being estimated by the betting aficionados of such criteria.
Earl A. Baker
Bon Air, Virginia

Bird sanctuary

Dear Sir: In connection with your interesting article in the August issue about the Suncoast Seabird Sanctuary, it seems to be in danger of being closed down. The *Clearwater* (Florida) *Sun* reported that neighbors have complained about flies, odor and noise, and the city has ordered Ralph Heath to close the sanctuary.
Virginia M. Taggart
Belleair, Florida

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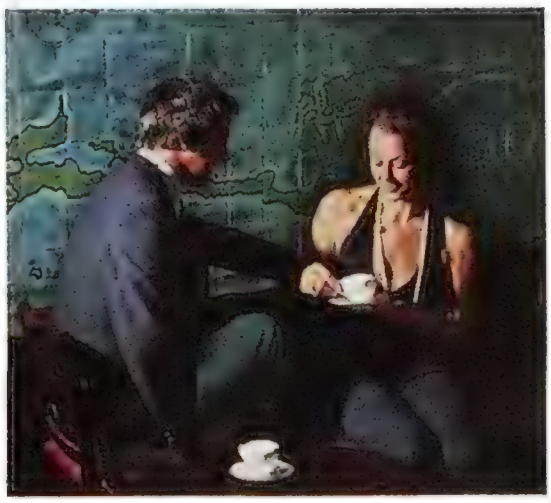

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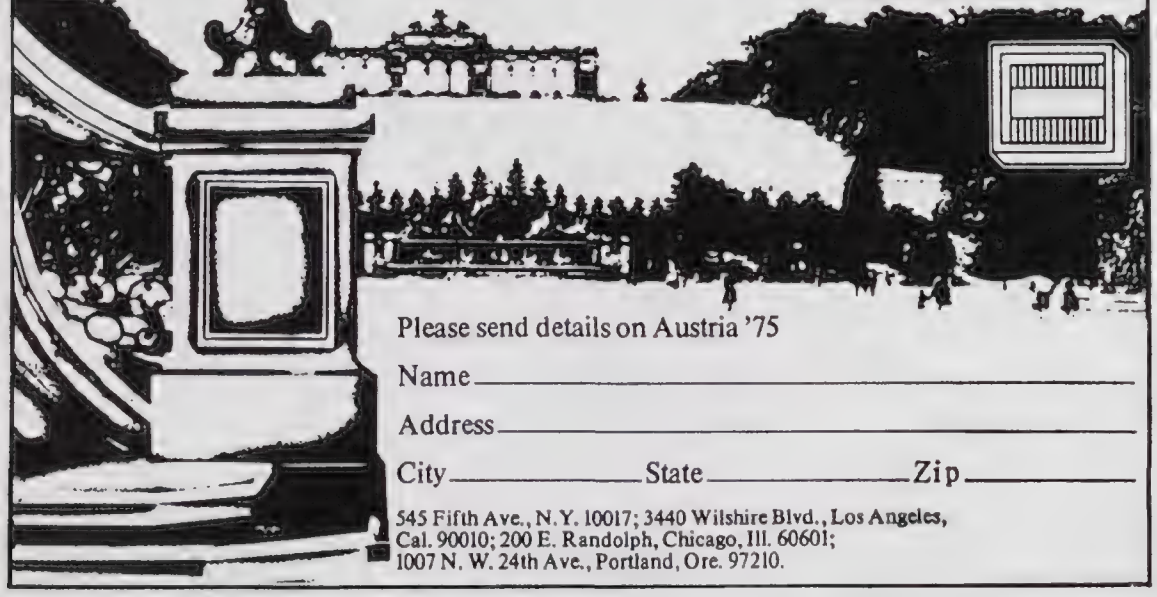

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Ralph Heath has now moved his birds to Indian Shores and the town commission has passed a law permitting him to stay. He has also received nearly $10,000 in donations. He credits the SMITHSONIAN *article and the news about the order to close for the continuing interest and financial support he has received.* Ed.

Barbary Wars

Dear Sir: In your article on the Barbary Wars in the January issue, the photograph identified as Stephen Decatur is actually that of Charles Stewart—also one of Preble's boys. The confusion was undoubtedly caused by the fact that the miniatures of Decatur [shown below] and

Stewart both appeared in the same color transparency and the wrong one was inadvertently copied.

William W. Jeffries
Director of The Museum
United States Naval Academy
Annapolis, Maryland

SMITHSONIAN INDEXES

Yearly indexes are available, at $1 per copy, through March 1974. The new index, March 1974 through April 1975, will be available in early summer.

Picture Credits

Cover Lee Boltin; 2 Lee Boltin; 16 The Museum, United States Naval Academy; 21 *Nature*, January 17, 1975; 28-39 Lee Boltin; 40, 42 Francis W. Sargent jr; 43-45 Fritz Goro; 48-56 Ross Chapple; 65-70 Alfred Eisenstaedt; 72-81 Terence Spencer; 82-89 Edward S. Curtis; 90-95 Andrew Skolnick; 97-102 Lane Yerkes; 116 Warren Krupsaw; 120 W. B. Park.

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Phenomena, comment and notes

Oldest boomerang, beloved bugs, and the benefits of being hyenalike; of being first and of being bored

"Against boredom," said Nietzsche, "even the gods themselves struggle in vain." Maybe so (though who is really to say), but some post-Nietzschean research suggests that there are occasions when we mortals should welcome a little boredom —if it is properly administered.

Writing in the *American Scientist*, Peter Suedfeld, who is head of the department of psychology at the University of British Columbia, describes various experiments perpetrated on willing students in which their senses were deprived of all or most external stimuli. For example, they would be confined for extended periods in totally dark, soundproof rooms. With absolutely nothing going on, one achieves a state which Dr. Suedfeld calls boredom.

When such experiments got under way in the early 1950s, the bad results were most publicized: anxiety, terrifying fantasies, hallucinations and so forth. But a careful review of the results of this kind of work persuades Dr. Suedfeld that a periodic dose of such boredom can increase one's capacity for memorization and may increase creativity (though it apparently depresses the ability for such complex tasks as writing a term paper). Also it makes one more persuadable. Dr. Suedfeld has had considerable success in persuading heavy smokers to cut down by giving them a 24-hour session of sensory

deprivation and a simple message about the hazards of smoking. In addition, the technique has helped some individuals overcome their fear of snakes.

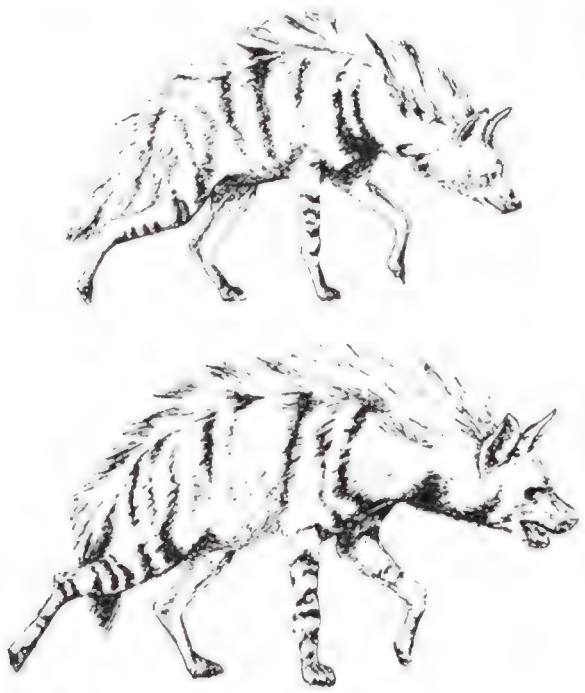
These may not be problems which confront the gods Nietzsche spoke of, but for the rest of us, these findings from what may come to be called the "It's-so-good-when-it-stops" school of psychology seem promising for various therapeutic needs.

Not a laughing matter

The creatures pictured below look like hyenas; in real life, they act like hyenas and they are found in the same place. Must *be* hyenas. In fact, one is an aardwolf. Though it is smaller than a hyena (about jackal size), it can raise its mane to give it the illusion of greater bulk and even experts get them mixed up.

Most people, upon hearing this, would conclude that the two are close relatives and leave it at that, but not Philip D. Gingerich, a paleontologist at the University of Michigan.

Writing in *Nature,* he explains that speciation, the process whereby one species evolves into two or more species, usually results in noticeable differences



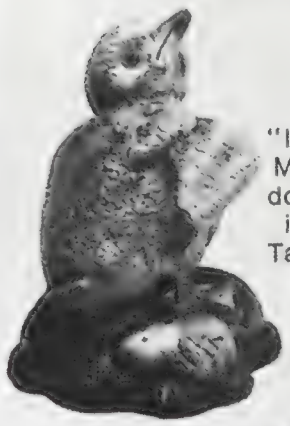
Aardwolf (above) and hyena (bottom).

in geographic location, behavior or appearance. Looking back through the fossil record, Dr. Gingerich notes that the aardwolf may well have branched off from some hyenalike ancestor ten million years before today's hyenas did.

So the aardwolf may well have started off in one direction, so to speak, and then

Boehm Birds

FOR MOTHER'S DAY—MAY 11



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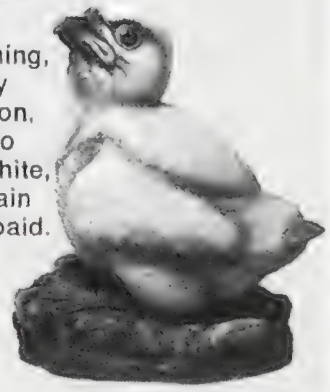

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changed course, only later evolving into its present hyenalike configuration. This convergent evolution can lead to mimicry, which is often encountered among insects, fish and birds. The advantage is that if you look like something known to be unpalatable or dangerous, you are less likely to be eaten. In the aardwolf's case, it is small and vulnerable while hyenas are larger and, apparently, meaner. Leopards, for example, rarely go after hyenas.

What is noteworthy about this proposed aardwolf-hyena connection is that it would be the first instance found of mimicry among large mammals. (Some small Bornean squirrels mimic an unpalatable tree shrew.) But before the Gingerich thesis can be confirmed, someone has to find out if (like human experts) leopards actually do confuse aardwolfs with hyenas, and thus avoid them.

The oldest boomerang

The chances are that no one will ever ask you how old the boomerang is, that still slightly mysterious aerodynamic tool that was presumably invented by the Australian Aborigines. The answer is that the earliest known boomerang has been found in a peat bog in South Australia dating back about 10,200 years. However, some tools which could well have been used for making boomerangs have been discovered at another site that is 16,000 years older.

So, if consulted on this matter, you can be prudent and say 10,000 years or boldly opt for the 26,000-year estimate. Nobody will argue with you, either way.

Some alternatives

One of the problems with using solar energy to produce electricity is concentrating enough heat in the usual solar collector. A good deal of the heat that comes in is radiated back through the glass. Now, according to *Technology Review,* three researchers at the Massachusetts Institute of Technology have a possible solution. They find that Pyrex with a very thin layer of gold or silver (and they mean *thin*: two-millionths of an inch) makes an effective transparent heat mirror, trapping errant heat inside.

One of the three men was Thomas B. Reed, who recently made headlines by running his car on methanol (wood al-

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cohol) added to the gasoline. He got better mileage, better acceleration and less pollution. A nice thing about methanol is that it can be made from a variety of substances, such as agricultural waste and timber waste, of which we have more than enough.

A bad thing about gold is that, according to the National Academy of Sciences, we are fast running out of it, along with copper, nickel and tin. But while it lasts, maybe we should paint it on our windows. Dr. Reed estimates that such a practice would eliminate about 25 percent of the heat loss from a typical home.

On being first

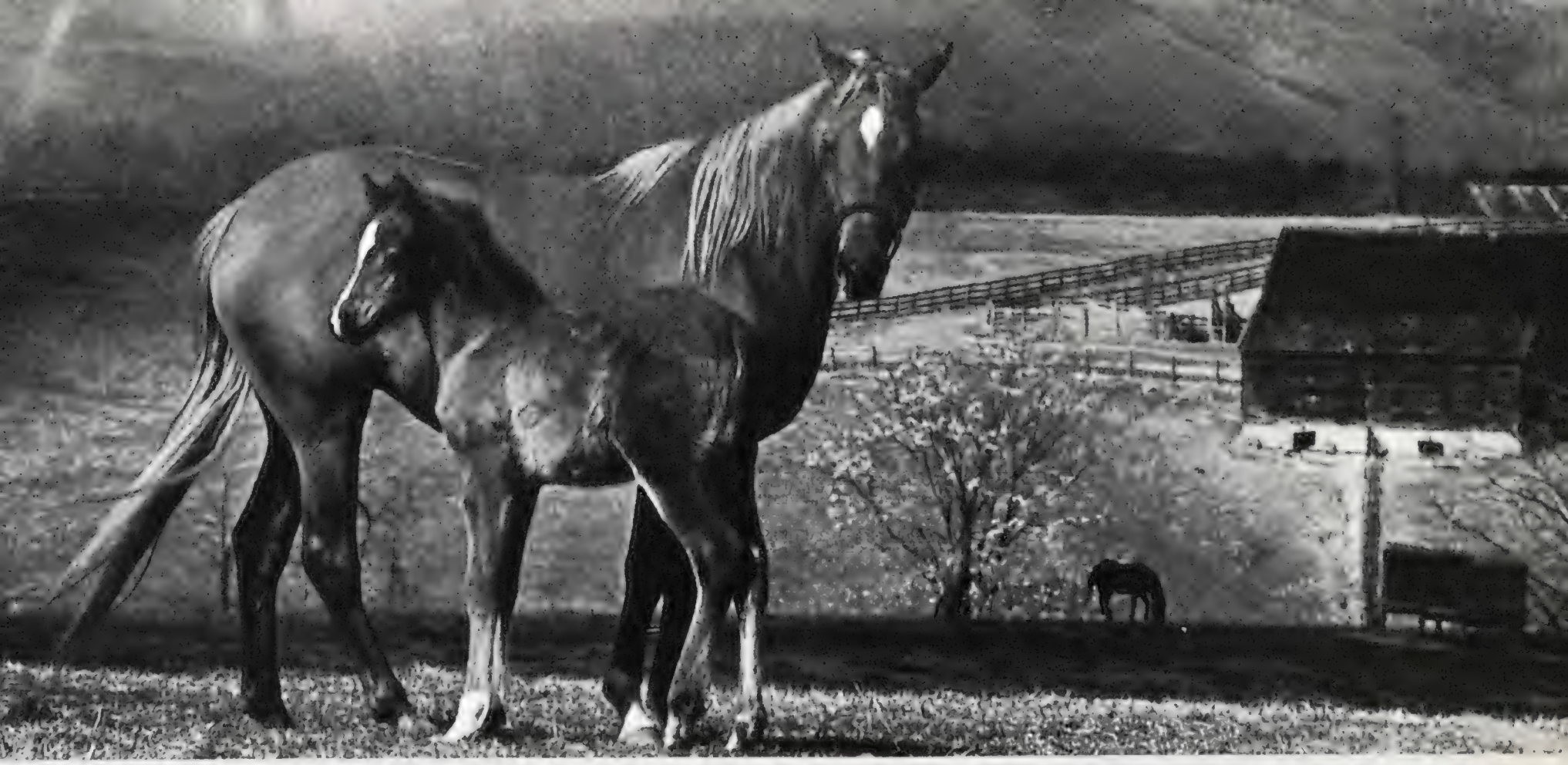
It is an obvious truism that large families do not help the population problem, but it may be that a large family does not help the family's brain power either. *Science News* reports on a Dutch study showing that the "brightest children came from the smallest families, and within a given family size, the brightest children are those who were born soonest."

Why? An answer comes from a Michigan psychologist, Robert B. Zajonc: The first-born's world is made up largely of inputs by adults; the world of a sixth-born child is made up largely of its brothers and sisters. It makes sense to Zajonc that "children from large families, who spend more time in a world of small-sized minds, should develop more slowly and therefore register lower I.Q.s. . . ."

Music to control the savage pest

In mankind's never-ending war against insect pests, a new weapon has been introduced. In this case the enemy is the Mediterranean fruit fly, which has become a scourge to the agricultural endeavors of Tunisia. Scientists there have found that the mating signal of this pest has precisely the same frequency as the lower F# on the Hohner Melodica Piano 26 (a fancy harmonica). According to the presumably surprised manufacturer, Tunisian scientists are now trying to make use of this insight to control the insect.

Indeed, most people find all insects—pests or no—offensive, if not downright fearsome. Even the most useful insects, such as bees (see Book reviews, p. 110), are abhorred by some people—and for good reasons, such as allergic reactions to bee stings. Nevertheless, while there



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have been few surveys on the subject, it seems that four bugs are viewed with almost universal benevolence: the lightning bug which, as a child, you chased with wonderment in the dusk: the cricket whose song cheers your hearth; the butterfly; and the ladybug which visits you on warm days in spite of alleged fires at home. It's pretty hard to find anyone who recoils at these gentle creatures (though some people do wish there were a few less crickets in the basement).

Given the generally warlike flavor of most insect studies, it is nice to find that the harmless ladybug has come in for a bit of professional attention. British researchers were puzzled about the phenomena of the two-spotted ladybug (which they call ladybird—SMITHSONIAN, February 1971): There is a red one with black spots and a black one with red spots. Melanism, the black phase, is unlikely to be the usual adaptation to the blackened habitat of industrial England, the researchers felt, because the colors of ladybirds are not for camouflage, but rather to advertise themselves (they taste awful). Instead, it appears that the black strain is an adaptation to lowered levels of sunlight caused by air pollution: Being black they absorb more warmth from the diminished sun and are therefore more active in getting food and searching out mates.

Unhappy news about fireflies

Another of the beloved bugs, however, has come in for some depressingly bad press. James E. Lloyd of the University of Florida has reported to *Science* that females of the lightning bug species *Photuris versicolor* attract males of four other species by adjusting their flashes to the males' patterns. And having worked their tawdry skills, these femmes fatales, as Dr. Lloyd calls them, thereupon devour the unwitting males.

Being an entomologist by profession, Dr. Lloyd may be unaware of the blow he has dealt to the nonentomologist's tenuous affection for the insect world, but he does end on a somewhat positive note: "These observations indicate that the capabilities of the firefly brain are more complex than hitherto suspected."

To which one must sadly add: Well, maybe the capabilities of the *female* firefly brain.

James K. Page jr.

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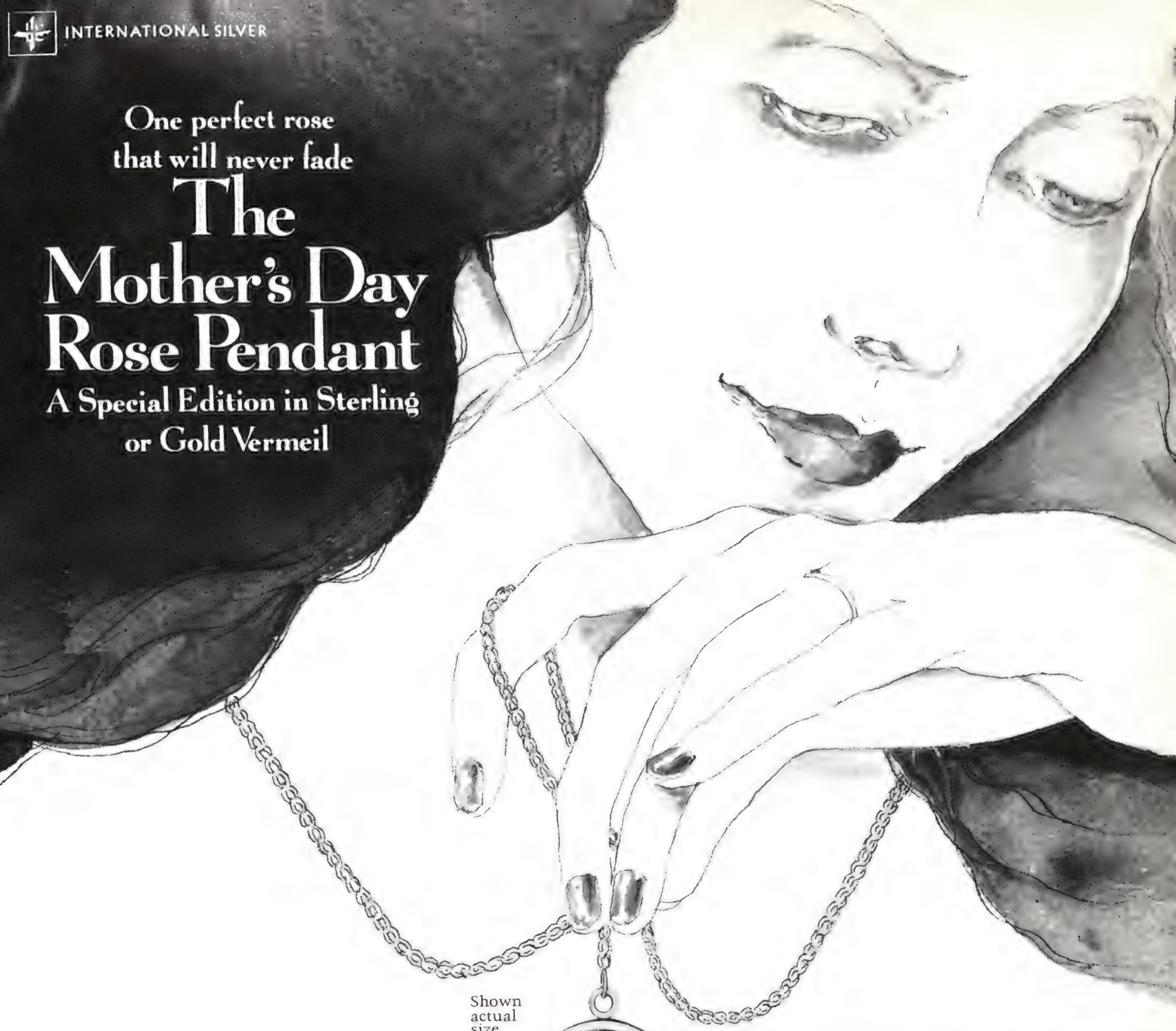

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USSR lends its dazzling Scythian gold for American exhibitions

By Rudolph Chelminski

Photographs by Lee Boltin

It will be seen at New York's Metropolitan Museum of Art, later in Los Angeles, revealing work of ancient steppe nomads

"The Royal Scythians," wrote Herodotus, "guard their sacred gold with most especial care, and year by year offer great sacrifices to its honor."

The father of history, as Cicero later called him, was correct. Toward the middle of the fifth century B.C. he had come to the Greek settlement of Olbia on the north shore of the Black Sea, one of the many commercial outposts thrown off from the motherland in those days. The purpose of his visit north, to the very edge of the civilized world, beyond which lay vast stretches of untracked land peopled by the most fantastic and frightening of barbarians—bald people! goat-hooved people! cannibals!—was to gather material for what was to become Book Four of his history of the Greek and Persian wars.

Of all the populations of the steppe above Olbia, the Scythians were by far the most important in Herodotus' time. For a few hundred years these fierce mounted nomads ruled the plain like invulnerable pirates, growing unconscionably rich from booty taken in battle, tribute exacted from more sedentary folk and trade with the Greek colonies. The Scythians had no towns, no temples, no large possessions: Everything they valued had to be small enough or mobile enough to accompany them in their seasonal wanderings. And what they treasured above everything was gold.

Scythian gold was not accumulated and secretly hoarded, but carried on one's person, grandly ornamental, a sign of importance and accomplishment. The Scythians wore gold combs in their hair, gold rings on their fingers, and gold in endless combination as necklaces, bracelets, earrings and headgear. Gold plaques were sewn to their finest clothing. Beautiful gold totem animals, fastened to the centers of their shields, protected them from danger.

The Scythian gold which remains today—only a tiny portion has survived the systematic looting of their tombs over the centuries—constitutes one of the principal national treasures of the Soviet Union. Many Americans have marveled at this trove on its home grounds in the USSR, but during the next few months a great many more will be able to see a portion of it in this country. On April 29 the Metropolitan Museum of Art in New York will open an exhibition called "From the Land of the Scythians," a comprehensive selection of ancient Scythian, Altaic, Urartian and Sarmatian artifacts sent here by the Soviet government under the current cultural exchange

Golden stag, 12½ inches long, was fastened to a shield; antlers are exaggerated to emphasize strength. Found in 1897, this is pure Scythian work of the late seventh or early sixth century B.C.

agreement. About half of the exhibition will consist of Scythian gold objects, including all of those shown in these pages, but there are also remarkable works in bronze, wood, felt, horn and iron. After the show closes in New York on June 29, it will go to the Los Angeles County Museum of Art. In exchange, the Metropolitan is sending 100 masterpieces of European and American painting from its own collections for exhibition at the Pushkin Museum in Moscow and the Hermitage in Leningrad.

What impressed Herodotus about the Scythians, and what made him decide to devote virtually all of Book Four to them, was that they had won a great military victory in favor of Greece.

What had happened was that the Scythians, against all expectations and precedent, ruined the huge offensive which Darius the Great of Persia began leading against them in 514 B.C. as part of his master plan for subduing Greece. The Scythians controlled the grain and livestock traffic from the rich steppe (today's Ukraine) which kept food-poor Greece alive. By clobbering these insolent horsemen—and who could resist an army 700,000 strong—he could starve Greece into submission. Darius and his host lumbered across the Bosphorus, angled north across Thrace and present-day Bulgaria, crossed the Danube and invaded Scythian territory, spoiling for a fight. In what must have been history's first example of the now well proven Russian tactic of scorched earth, the Scythians gave Darius a bitter pretaste of Napoleonic and Hitlerian futility: They retreated, keeping one day ahead of the sluggish Persian machine, burning crops and plugging wells, then turning at odd moments to make vicious, slashing attacks against the aggressor's flanks. As week after week passed—Darius had confidently told his rearguard at the Danube crossing-point that he would be back within 60 days—the bloodied Persian frustration grew along with the soldiers' hunger and thirst. Finally, the nonplussed Darius resolved to send a messenger to Idanthyrsus, the Scythian king.

"Thou strange man," he protested, "why do you keep on flying before me, when there are two things you might do so easily? If you deem yourself able to resist my arms, cease your wanderings and come, let us engage in battle. Or, if you are conscious that my

Mr. Chelminski's most recent SMITHSONIAN *article was on Hitlerian art in the February issue.*

Mare with suckling foal, a cow and a calf (above) are among domestic scenes of inner ring of pectoral.

The outer ring has scenes of more violent activity: griffins attacking a horse (center), a panther

strength is greater than yours—even so you should cease to run away—you have but to bring your Lord [meaning himself] earth and water, and to come at once to a conference."

Idanthyrsus answered with another speech of his own, which ended with some succinct advice: "Go weep." Which, we may safely assume, was the nomadic equivalent of "Get lost." Puzzled and exhausted, Darius gallantly left his sick and wounded behind and scrambled for the Danube. With him he bore the Scythians' only tribute: a bird, a mouse, a frog and five arrows. "These men do indeed despise us utterly," he concluded.

If Herodotus felt gratitude to these cavaliers for having saved Greece, we of the 20th century may be thankful that they evidently believed in a form of life after death. The beyond, as the Scythians apparently conceived it, was quite like life on Earth, and to deal with it every man would need to carry with him everything he held to be most dear and most useful. As a result, all the Scythians—even the poor, sedentary ones who tilled the soil, but especially the warriors and their chiefs—had elaborate burials which mirrored their living environments. If Soviet archaeologists

Easily the most spectacular of recent finds (it was excavated in 1971), this 12-inch gold pectoral is of Greek workmanship, executed for the Scythians in the fourth century B.C. Details shown below.

and a lion attacking a boar (right). Separating the two openwork rings is a band of exquisitely worked flowers and tendrils. The 48 figures were cast individually and soldered to the twisted gold frame.

Scythian treasures lent by the USSR

have discovered the skeletons of simple farmers with bronze and clay vessels placed next to them, they have also unearthed tombs of kings and princes which are nothing short of fabulous. The burial mounds were the Scythians' pyramids.

Their funeral customs as described by Herodotus were striking by any measure. The harsh conditions of nomadic life on the steppe seem to have created a most exacting loyalty to chieftain and king, one which demanded that many of his subjects join him in his grave. A Scythian of great importance was embalmed at his death (an herbal mixture of chopped cypress, frankincense, parsley seed and anise seed was stuffed in the abdominal cavity, after which the body was encased in wax) and taken around his territory for 40 days. The cart bearing his body was followed by ostentatiously grieving subjects, who engaged in all manner of self-mutilation and choruses of wailing, shouting and jingling bells. The burial chamber was dug deep below ground level, buttressed by wooden beams and topped off with an immense earthen mound. Inside the tomb the chieftain was dressed in his finest gold-sewn clothes, surrounded by his gold treasure and left with his weapons to defend it.

But he did not go to the afterlife alone. Far from it. It was common practice for the ruler's favorite concubine and closest servants to be sent with him, persuaded by the gentle art of strangulation and themselves adorned in their best gold. Accompanying them all on their voyage were his horses, put to ritual death—as many as 360 have been found in a single grave—and lain around them in procession, themselves bedecked in leather and gold and felt. One final practice completes the macabre picture: One year after a king's death, up to 50 of his young bodyguards would be volunteered for strangulation, along with a similar number of horses. They were then impaled with wooden lances atop their mounts and propped up in a circle around the grave—ghostly riders of a ghostly honor guard.

Who were the Scythians? Many theories have been offered over the years and some, at least, have now been eliminated. There is general agreement that they were of neither Asiatic nor Finno-Ugric stock, as had been occasionally presumed. All the signs now point to an Indo-European origin; more specifically, they were northern Iranian. The ancestors of the Scythian nation took to the immense sweep of the Eurasian plain, which stretches from the Danube all the way to the interior of China. Over the centuries this steppe has been like a gigantic vein flowing with different tribes and races, touching and mingling, bumping into

This gold comb, reflected in a mirror to show both sides, is from the fourth century B.C. The men wear Scythian costumes, but the Greek goldsmith who made it gave two of them Greek armor (opposite).

each other in periodic migrations, swirling apart and often gathering their forces to slaughter each other.

Contemporary Soviet scientists deliberately limit the term "Scythian" to the tribes which settled north of the Black Sea, as described by Herodotus. Other related tribes also roamed the steppe, and similar burial mounds exist by the thousands deep into Siberia and the region of the Altai mountains, near the present Sino-Soviet border. It was, in fact, from Siberia that the first inklings of a previously unknown ancient art began reaching the modern world: the Animal Style.

In 1715, Peter the Great and the Empress Catherine I received as a gift, on the birth of their first son, a large number of decorative gold ornaments, all of them covered with intricate designs of animal forms. Peter was so taken by these curiosities that he issued an order forbidding the common practice of grave-robbing and the melting down of the historical artifacts for common gold. In the years since, the objects found in tombs of the Black Sea Scythians and related tribes to the east have grown into the stunning collections now found in the Hermitage in Leningrad and the Lavra Museum in Kiev, the two principal sources for the show at the Metropolitan.

This is not the first time that the Soviets have parted with some of their Scythian treasures for the benefit of foreign viewers (there have been Scythian shows in France, Holland, Italy, Japan and elsewhere), but the Metropolitan's selection is by far the largest. It is also the first one ever to be lent to the United States.

"If you only knew how hard it was to give all of them up," said Dr. Boris Piotrovsky, director of the Hermitage. "I cried big tears."

To show the scope of the Animal Style discoveries in the Soviet Union, Piotrovsky has included both pre- and post-Scythian objects, as well as many from the Siberian burial mounds of the Royal Scythians' distant relatives. The stars of the show, though, are unquestionably the fruit of the digs in the Black Sea area southeast of Kiev.

The Animal Style is exactly what its name implies: endless representations of deer and eagle and panther and lion and all the other creatures (sometimes imaginary, as griffins) which the Scythians would have encountered in their wanderings. Dr. Yaroslav Domansky, a member of the Hermitage's prehistoric culture department, suggests a twofold use for this bestiary: first, as a protective personal totem, such as a stag in the middle of a shield; and, second, as pure decoration, for which any kind of animal at all could serve to bedeck clothing, quiver or saddle. Being mounted nomads, the Scythians perforce had to limit themselves to relatively small objects, so nothing of their art is grandiose in size. As usually happens in illiterate cultures, the Scythians had an acute visual sense which enabled them to bring extraordinary excitement and grace to the animals they represented.

The enigmatic scenes on this vase have had many interpretations including the one in the text (p. 38).

Scytho-Siberian plaque from Peter the Great's collection depicts combat between tiger and monster.

Panther shield totem is among strongest examples of Animal Style (early sixth century B.C.).

Head of Athena, inspired by statue in the Parthenon, adorns Greek-made pendant (fourth century B.C.).

Much of what is known about the way the Scythians looked and dressed has been learned from such

It may be presumed that the Animal Style originally began with bone and wood carvings, later replaced by gold, but except for the Altai burial mounds in Siberia, where perpetual freezing preserved much wood, felt, leather and other organic matter, none has survived. The famous recumbent stag shield centerpiece (pp. 28-29), though undoubtedly a casting by the "lost wax" technique, bears strong resemblance to the inclined planes of a wood carving. The stag's beautiful and quite realistic rendering is set off by the surprisingly fanciful continuation of the antlers all the way down the back, an exaggeration by which the artist underlined the essence of the animal's strength.

The same reinforcement of a totem's magic protection is seen in the panther shield centerpiece (p. 35); in most ways it resembles a normally fierce, fang-baring panther, but its significance is restated in the tiny panthers twisted head-to-tail at the beast's feet and along its tail.

The greatest period of purely Scythian artistic creation seems to have been the sixth century B.C., after their defeat of the Cimmerians and before their own

finds as this marvelously detailed gold and silver cup, executed by Greeks in fourth century B.C.

downfall at the hands of their tough eastern cousins, the Sarmatians. Both the panther and the stag are of this period. By the fifth century B.C., though, Greek influences began to appear in the gold art, and they only grew stronger with the passing of time. Wealthy Scythians, obviously charmed by the high level of craftsmanship and sophistication of the Greek artisans in towns like Herodotus' Olbia, began ordering from them, as well as from their native artists.

A good example of a Scythian "mail order" from Greek craftsmen is the astonishing comb (pp. 32-33). Discovered in the Solokha barrow near the Dnieper River some 180 miles south of Kiev, it depicts violence, a recurrent and important theme in Scythian art.

The violence on the comb is purely human: Three Scythians, one mounted, have at each other, above a small frieze of recumbent lions. Both the horseman and the warrior on the right, whose mount has been slain (note the blood flowing from his neck wound), wear Greek helmets and are protected by armor; the foot soldier on the left rushing to help his mounted chief wears the simple Scythian caftan and is helmet-

The fourth-century B.C. grave of a young Scythian woman is reconstructed as it was found in 1971.

less. The scene shows, as Dr. Domansky points out, that by then it had become common for certain Scyths to buy Greek armor, as well as Greek art.

The famous cup from the Kul Oba dig (p. 34), made of electrum (a natural gold-silver alloy), is adorned with a marvelously realistic relief showing scenes which until recently had been described as mere stray vignettes of Scythian life: two men conversing, one apparently probing for the other's aching tooth, one dressing another's wounded leg and the last stringing a bow by bending it under his leg. But one final element had been missing until now: a more accurate interpretation of the four vignettes. Dr. Piotrovsky today believes that the riddle has been puzzled out by Dmitri Rayevsky, his colleague in the Moscow Institute of Ethnography. Far from being random scenes of life on the steppe, Dr. Piotrovsky says, the vignettes represent a Greco-Scythian legend of the founding of the Royal tribe, a variant which has the Scythians descending from Hercules. Having fathered three male children by a strange half-woman, half-serpent goddess, Hercules directed that she give them each a chance to string his bow when they grew to manhood. He who succeeded would be worthy to lead the tribe. Suddenly the vignettes offer an easy meaning. The two big brothers have a try at the bow, but one—ouch—gets it in the mouth when he can't hold the tension any longer, and the second received his punishment in the leg. Little brother squats resolutely on the ground and manages to string the bow. In the last scene he is seen as the new king, being invested by a priest.

The brilliant pectoral (pp. 30-31), the supreme example of Greek workmanship in service to the Scyths, was found only in 1971 in the great Bliznitsa dig just south of the Sea of Azov. Each part was cast separately and then carefully soldered into place. The three rows each depict a different aspect of the Scythians' experience: man and animal, floral and vegetable nature, and, finally, the recurrent theme of violence. In the peaceful first row, two Scythians work together on a sheepskin shirt, while two others milk ewes and horses, goats, cattle and ducks gambol. Bits of the original enamel still remain on the floral arrangement of the second row. In the third, griffins, lions and panthers attack luckless horses and a wild boar, while dogs chase rabbits.

By 300 B.C. the declining Scythians had suffered the fate of their victims the Cimmerians. They were pushed from the steppe by the even more warlike Sarmatians, who had impressed Herodotus by the fighting quality of their women—descended, he said, from the legendary Amazons and able to hold their own with the best of male soldiers. The Scythians' last refuge was in the confines of the Crimean peninsula, but by 106 B.C. the last of them disappeared, swept clean from the slate of history. The cruel logic of the steppe eventually held good for their conquerors, the Sarmatians, too: the Huns, the most terrible and powerful of all the mounted tribes, destroyed them in turn.

As the years pass, the continuous Soviet digs into the still untouched Scythian burial mounds will doubtless help to define the exact limits of their territory, the dates of their ascendency and decline, and the correlations between the many tribes of the Eurasian plain. Perhaps a few more masterpieces like the pectoral or the panther shield totem will be unearthed. In contrast to the outright plundering of the time of Peter the Great, Soviet archaeologists now approach each new dig with a traditionally painstaking scientific precision which often, happily, can be helped along with such modern conveniences as tractors and bulldozers to do the brute work of sweeping away the huge dirt caps from the tombs. And modern science has still further shortcuts up its sleeve: According to Mrs. Oksana Ganina, director of the Lavra Museum in Kiev—the principal beneficiary of recent Royal Scythian discoveries—the Kiev Cybernetics Institute is working on a metal-detecting sounding device to help archaeologists put priorities on the approach to specific burial mounds.

"That will help, of course," she says with something very close to resignation, "but there are thousands and thousands of unopened barrows, not only here, but in Siberia as well. All of them will probably be investigated some day. But not, I am afraid, in our lifetime."

In this enlarged detail from a fourth-century B.C. gold clothing ornament, found in the Crimea in 1830, two Scythians share the same drinking horn exactly as in a ritual described by Herodotus.

By Peggy Thomson

Value is extracted from a nuisance

Horseshoe crabs, hated by shellfishermen and beach-goers, contain a substance in their blood that can be of wide medical use

When the Barnstable (Cape Cod) *Patriot* came out for protection of the "ugly bluebloods," the object of its sympathetic attention was the horseshoe crab—a spike-tailed, armor-plated creature the size of a saucepan with a pedigree back to Triassic times and with blood that is literally blue, the pale aquamarine of a shallow salt sea.

For an animal with more enemies than friends—it is prominent among the most-wanted predators of the Cape's shellfishermen—the *Patriot's* endorsement is an odd turn of events. Few in the past have suggested protecting this hardy survivor. Quite the contrary. Its dark form gliding among the eelgrass of tidal bays has always seemed a sinister presence. Its spike looks menacing. So do its bristly legs which grind down its food, including, to its discredit in a shellfishing community, young mollusks in prodigious quantities.

Within recent memory the Cape has had a bounty on the horseshoe crab. Even today, the Massachusetts Marine Fisheries Division advises cutting down the horseshoe crab population by baiting conch traps and eel pots with smashed, egg-loaded females; vacationing clam diggers are instructed by the terms of their licenses to crush the offending animals underfoot or to throw them up above the tide line to die.

The reason for the odd turnabout is a recent finding that an extract from the blue blood is a fantastically sensitive diagnostic tool, so sensitive a detector of bacterial endotoxin that it is probably going to change the purity standards for biological tests by a whole order of magnitude. And this extract is going to be worth a packet.

The horseshoe crab is, of course, something of an oddity. It is found only on the western shores of the Atlantic from Nova Scotia to Yucatán and the coastal waters of Asia from Japan to India, and including Indonesia and the Philippines. None off the U.S. West Coast or off South America, none in European waters. And there's been a great deal of confusion about its identity. Kipling drew the horseshoe crab recognizably but inaccurately in his *Just So Stories.* Besides, he made the mistake of having it crawl sideways. And, like other Europeans, he called it the king crab—which it is not.

In fact, it's not a crab at all, or even closely related to any other living thing in the sea; instead, it is unique among the arthropods (jointed bodies, jointed legs), somewhere between the crustaceans and the arachnids, or *Xiphosura,* with its closest relative the land spider. To minimize the confusion, scientists use the horseshoe crab's generic name *Limulus* (genus *Limulus,* species *polyphemus*).

Limulus then being the name of the newly admired beast, *Limulus* lysate is the substance from the blood for which the uses appear to be many and highly promising. And it is to insure a good supply of the lysate (which sells for thousands of dollars a liter) that there is talk of protection—in order that *Limulus* may grow, breed, bleed and live on to be bled again.

In Woods Hole on the Cape, where much of the *Limulus* research has been conducted in recent decades at the Marine Biological Laboratory, a neighboring institution—the Woods Hole Oceanographic Institution—has recently gone into production of the lysate for its own research purposes. In season, WHOI (pronounced "hooey") bleeds some 300 to 400 *Limuli* a week to produce two to three liters of the lysate. The blue fluid—blue from the copper-containing molecule which carries the oxygen in *Limulus* blood—goes down the sink drain at the end. Saved are the blood cells, which are centrifuged out as gray-white flakes. The proteins extracted from these cells are then freeze-dried for shipment to hospitals, laboratories and drug companies and reconstituted as an opaque liquid.

The beauty of this liquid, no longer blue, is that it clots in contact with endotoxins, which are components of the outer cell wall of gram-negative bacteria, and it thereby signals the presence of endotoxin contamination. Endotoxins themselves are everywhere, in food and water, even in sterile water (they aren't destroyed by autoclaving), on people's skin and in their

In previous issues of SMITHSONIAN, *Mrs. Thomson has written about the Foxfire project, old-fashioned farming, inaugural trappings and White House toys.*

To supply researchers at Woods Hole, students shove a dinghy filled with horseshoe crabs ashore.

gut. And they are harmless until they enter the bloodstream—which they do through shock or in severe illnesses or burns—where even minute amounts may kill. For that reason, materials injected into patients in the form of blood components or intravenous fluids or other medications have to be kept endotoxin-free.

Current monitoring for endotoxins is less than satisfactory, as the tests depend on the well-being of a group of rabbits. If the rabbits develop fever from an injected solution, the solution, it's assumed, contains endotoxins; if they don't, it doesn't. The rabbit fever test is awkward to perform and expensive (some large drug companies spend more than a million dollars a year to maintain their rabbit farms). It has low sensitivity (smaller amounts than those a rabbit responds to may be toxic to a human).

The lysate tests, which are quick, easy and relatively cheap, at $2 apiece, are ten to a thousand times more sensitive. "A test can detect," according to marine bacteriologist Dr. Stanley Watson, "contamination in the amount of one nanogram, or one billionth of a gram, per milliliter."

Today most of the big drug companies are experimenting with the lysate, which is the end product of this ritual. So is the Food and Drug Administration, which uses the lysate tests itself, along with rabbits, to demonstrate excessive levels of bacterial endotoxin in biological products, such as vaccines, serums and gamma globulin. The FDA is still some months from granting the test official recognition.

To drug manufacturers there's both promise and threat in the new tests. The positive prospect is for effective in-house quality control, whereby the lysate gives early warning of trouble, warding off possible recalls of products, bad publicity, lawsuits. The apprehension comes from uncertainty, now that it's possible to set far more stringent purity standards, over just what level of endotoxin contamination will be considered acceptable. Or even what that level should be. The level of endotoxin that will cause a fever in a healthy volunteer could be more serious in a patient under medication. Some drug companies have refused the lysate even when offered free.

According to reports from a University of Southern California medical team, and more recently from physicians at Children's Hospital in Washington, D.C., and in Los Angeles, the lysate has also been found to be an exquisitely sensitive aid in diagnosing gram-negative spinal meningitis in children, a dread form of meningitis in which it can be a matter of a child's life to initiate the proper chemotherapy quickly. Within an hour the lysate-tested spinal tap yields a report on minute amounts of the endotoxin, whereas conventional culture techniques take at the very least eight hours, often 24 to 48, and even then detect only a portion of the organisms.

Cancer research is still another area where the lysate is a benefit, most notably in the research at New York's Memorial Sloan-Kettering Cancer Center under the direction of the hospital's president, Dr. Lewis Thomas, pediatric researcher and pathologist, who gives a spirited account both of *Limulus* and of the MBL in his 1974 book called *The Lives of a Cell.*

One aspect of the research derives from the curious finding that impurities in drugs used for treating cancer may sometimes benefit patients more than the drugs themselves, a finding with its origins in Dr. William B. Coley's suggestion, more than 50 years ago, that malignant tumors might be treated with bacterial toxins. Since endotoxins are known to inhibit cancer-cell growth, the ability now to detect subtoxic trace amounts with the lysate could lead to controlled therapy with the endotoxins. In any case, it seems

Horseshoe crab glides through the shallows. It is not a crab at all but more closely related to spiders.

promising to explore the endotoxin-lysate interaction and to press on with understanding *Limulus'* clotting system as a model for clotting in human beings.

It was almost 20 years ago that the early work was done at Woods Hole. There a summertime investigator, Dr. Frederick Bang of Johns Hopkins, found in a moribund *Limulus* that the site of its infection was sealed off by a gelatinous clot. Dr. Jack Levin, also at Marine Biological Laboratory and also from Johns Hopkins, showed that the clotting system was localized within the amebocytes, which are the only type of blood cell *Limulus* has, and that extracts of the amebocytes were clotted by minute concentrations of endotoxins. And it was in his labs that the first practical application was made—using the lysate to detect infections in the blood stream of human beings.

For Levin and his scattered colleagues, the appeal of *Limulus* derives from its being so unimaginably old—the only living member of its group, if not strictly speaking the living fossil that it's often called—so old and so seemingly unchanged over the ages, so impervious, apparently, to evolution. And yet not what scientists would want to call simple. Or primitive. "The very fact that *Limulus* survives reflects a high degree of biological efficiency. Is it unsophisticated" asks blood researcher Levin, "for *Limulus* to have an entire blood coagulation system packaged as one cell rather than as a series of components floating in plasma, as human beings have? Neatness in packaging doesn't imply a lack of sophistication. It's *very* sophisticated. It's sophisticated on the part of *Limulus* not to have evolved itself out of existence."

For example, *Limulus* never acquired fail-safe mechanisms such as antibody defenses. It never had to. When infection attacked, *Limulus* sealed off the infection with a clot.

Gorgeous cells, remarkable eyes

Grown men and scientists all, they speak of the research animals creeping about in the ever-bubbling lab tanks with admiration verging on ardor. "Gorgeous," MBL investigator Dr. Frank Belamarich says, waving a hand toward his microscope. "The cells are so dynamic, so gorgeous. The animal itself is gorgeous." Belamarich, whose prime interest is *Limulus'* clotting process, and its implications for understanding the clotting of human blood, hauls a specimen dripping from the water where it has been feeding on mussels he smashed for it. *Limulus* can go for a year without eating, survive doses of radiation that would kill a man, as well as extremes of temperature and salinity, but he treats it well to keep up its blood.

Belamarich talks about the marvelous economy in *Limulus* motion—by which the legs, as they propel the

The crabs are lined up in racks, folded to expose the hinge. A needle in the hinge draws out blue blood.

body forward, also grind the food and push it toward the mouth, and the gill plates, as they paddle, also circulate oxygen to the blood.

And then, of course, there are the remarkable eyes—the large, compound lateral eyes, set wide, the median eyes up front containing ultraviolet sensors, with a rudimentary eye between them, plus several others including a lensless ventral eye containing photoreceptor cells. Dr. Haldan Hartline of Rockefeller University won a Nobel prize in 1967 for working out the retinal organization in *Limulus*. Among others, Dr. Joel Brown, of Vanderbilt University, does research on *Limulus* vision, blessing the animal for its large, naked, accessible cells that invite experiment.

For Brown the beauty is that the receptor cell is some ten times the size it would be in a toad. He can stick two, even three, microelectrodes into it and perform experiments which probably won't be possible with a toad's eye for another decade.

Another scientific admirer of *Limulus* in Woods Hole is John Valois, who supplies marine plants and animals to MBL and other research organizations. Along with many of the local fishermen, Valois has had the experience of watching the *Limulus* mate, out on the inland banks of Nauset Beach. Much like the Pacific Coast grunion, *Limulus* mates at the highest spring tides. Valois has seen in dawn light the troops advance on the beach, hundreds at a time, onto the wet sand, the female dragging the firmly attached male or frequently a clutch of them. The female burrows out her nests, laying a quart of eggs in a series of them, and when the eggs are fertilized by the males, the nests are covered over by a cave-in of sand.

Sand keeps the eggs aerated and moistened until the next high tides, again extra high, churn up the nests, rupturing the membranes and washing the wriggling larvae out into the shallows.

Valois's weekly supply for the WHOI bleeding comes from some young collectors out on Pleasant Bay, at the elbow of Cape Cod protected by the spit of Nauset Beach, which is said to contain some of the least polluted water between Maine and North Carolina. There Harvard graduate Bill Sargent, son of the Massachusetts former governor, along with two friends ran both an ecology camp for high schoolers and a small marine science center last summer. The young people do their *Limulus* collecting during low tides, pulling up their catch by the tail spikes and carrying four at a time, water dripping from the rubbery kelpy-looking underparts. Some of the dark old mottled carapaces are covered with barnacles and slipper shells and streamers of algae. They're hard as horn, while the newly molted blond-olive ones are easily dentable.

When the boat is filled to its wooden seats and be-

Dr. Stanley Watson, a Woods Hole bacteriologist, has his own bleeding operation located in his garage.

yond, the young people head it back to the holding pen which they constructed (and reinforced following the pre-dawn escape of their first catch of 400). Sargent hopes this summer to study *Limulus* behavior, including their movements, which he wants to do by tagging specimens with small radios.

Ecology-minded people like Sargent think the producers of the lysate (of which there are several, in Virginia and Florida as well as Massachusetts) should be studying just how much blood one *Limulus* can safely give and how often. They should return the bled crabs to the waters they came from (he's had only modest success getting his back), and should state their policy on maintaining the *Limulus* populations. No one knows for sure about the size of these populations. Many think that the animals are getting scarcer, certainly the big ones.

With the slow maturing process making it impractical to farm *Limulus,* the obvious course is to come up with a synthetic lysate. Mike Hickey, a state marine fisheries biologist stationed at Sandwich, is so sure this is what the "science boys" will do that he expects the whole protection talk to blow right over.

Meanwhile, he's just grateful to the scientists for scooping some of the offenders out of the water. Hickey pulls out files to show that 50 percent of the Cape's towns list *Limulus* as a menace they want him to do something about, and so far as he's concerned that's still his job. He quotes his own predators manual to the effect that one horseshoe crab cleans out a square foot of clam flat daily, it eats the equivalent of 60 platefuls of fried clams a year, and even a three-incher can down 100 clams over a weekend.

Taisto Ranta, shellfish warden for Barnstable, says he's trying his level best to keep an open mind, but the new discoveries don't prevent him from pining over the loss of the 27 bushels of seed clams he planted last April. He says he watched the horseshoe crabs move into his flats in drill formation and plow up the rows where he'd planted them, without deviating either to left or right. Both men say that they see enough evidence of the big animals out in deeper water, at 30 and 40 feet, where *Limulus* foul fishing nets and get caught in dredges, to rule out any scare talk of a shortage.

This winter, once again, the Cape's beach wrack was littered with the cast shells—thousands upon thousands of little ones, flimsy as watchworks, saucer-sized ones and huge ones like abandoned German Army helmets. WHOI's bleeding operation awaits the return of the adult *Limulus* from the deep water where they had buried themselves until spring. Then *Limulus,* which has seen the dinosaurs come and go, has survived eons of neglect and some abuse, will have to test its armor plate against success.

The fluid, blue from copper in it, will be thrown away,
the blood cells saved, and the crabs returned to sea.

actual size

45mm. Sterling Silver

40mm. .500 Silver

33mm. Cupro-nickel

28.65mm. Cupro-nickel

23.72mm. Cupro-nickel

19.53mm. Cupro-nickel

21.72mm. Bronze

17.65mm. Bronze

The government announces

Limited Edition Proof

"1975 will be a historic year for Papua New Guinea: our nation will become independent and will issue its first coinage. The Government of Papua New Guinea, through its central bank, the Bank of Papua New Guinea, has authorized the minting of a strictly limited edition of complete Proof Sets of this historic first issue—each set to contain flawless Proofs of all eight of its new coins, with the two largest coins, commemorating independence, struck in silver."

Michael T. Somare

Honourable Michael T. Somare, M.H.A.
Chief Minister of Papua New Guinea

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# of Papua New Guinea its first national coinage

Sets available only until April 30, 1975

significantly through the years.

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Beautiful coins of a beautiful land

The new nation of Papua New Guinea unites the former Territory of Papua and the United Nations Trusteeship of New Guinea. Located north of Australia, on the second largest island in the world, Papua New Guinea is a land of great beauty. Of snow-capped peaks and tropical rain-forests. Of rushing rivers, palm-shaded ocean beaches, and fascinating wildlife.

On this historic first coinage, the extraordinary wildlife of Papua New Guinea will be depicted in finely sculptured detail, together with the symbols of the nation's sovereignty. The Bird of Paradise—the national bird of Papua New Guinea—is portrayed on the largest coin to be issued, the 10 kina denomination. The five stars of the Southern Cross will appear with the Bird of Paradise just as they do on Papua New Guinea's national flag. And the national crest of Papua New Guinea will appear on the reverse. The Proofs of this coin will be minted in solid sterling silver.

The 5 kina coin depicts the New Guinea Eagle. In earlier times, the feathers of both the Bird of Paradise and the Eagle were used as currency, and they are still highly valued for their beauty. The Proofs of this coin will be minted in .500 silver.

The 1 kina coin also recalls the past, when coins with center holes were strung on string or on sticks. This unusual coin depicts the sea and river crocodiles of Papua New Guinea, both of which are now protected species.

The coinage employs the decimal system, with 100 toeas equal to 1 kina. (When placed in circulation in Papua New Guinea, one kina will have a value there approximately equal to $1.35 U.S.) The Cassowary, a large flightless bird of the forest, is portrayed on the 20 toea coin. The charming Cuscus, on the 10 toea coin, is one of more than 100 species of pouched mammals native to this land. The Plateless Turtle, on the 5 toea coin, is found only in the rivers of New Guinea. The Ornate Butterfly Cod, one of the fascinating fish abounding in the coral reefs offshore, is portrayed on the 2 toea coin and the spectacular Paradise Bird-Wing Butterfly appears on the 1 toea coin.

Together, the coins form one of the most beautiful and unusual coin of the realm sets ever issued by any nation in the world.

Proof Sets must be ordered by April 30, 1975

PROOF SETS of this first coinage are available only until April 30, 1975. The number of Proof Sets minted will be exactly equal to the number ordered by that date. *No other Proof Sets of this first year's issue will ever be minted.* There is a limit of two Proof Sets per order.

Each complete Proof Set will be housed in a deluxe presentation case and will be accompanied by a Certificate of Authenticity. The official issue price is $60 per Proof Set.

INDIVIDUAL PROOFS of the 10 kina coin will be minted in solid sterling silver, and these may be acquired at the official issue price of $32.50 each. There is a limit of two individual Proofs of the 10 kina coin per order, and orders must be postmarked by April 30, 1975.

COMPLETE UNCIRCULATED SPECIMEN SETS of the eight coins are available at the official issue price of $30 per set, but these coins will contain no silver. The 10 kina and 5 kina coins in these sets will be minted in cupro-nickel. Uncirculated Specimen Sets will be available until the authorized production limit has been reached.

To acquire these important first coins of the new nation of Papua New Guinea, complete the order form below and mail it directly to the official minter: The Franklin Mint, Franklin Center, Pennsylvania 19091. The absolute deadline for ordering Proofs is April 30, 1975. No exceptions can be made. Orders for Proofs postmarked after April 30 cannot be accepted and will be returned.

OFFICIAL ORDER FORM

THE FIRST NATIONAL COINAGE OF PAPUA NEW GUINEA

The Franklin Mint
Franklin Center, Pennsylvania 19091

All orders for Proofs must be postmarked by April 30, 1975.

Please accept my order for the following:

_____ QTY Limit 2 COMPLETE 1975 PROOF SETS at the official issue price of $60.* plus $2. handling charge ..... $_____

_____ QTY Limit 2 INDIVIDUAL PROOF COINS of the sterling silver 10 kina piece, at the official issue price of $32.50* plus $1. handling charge ..... $_____

_____ QTY COMPLETE UNCIRCULATED SPECIMEN SETS at the official issue price of $30.* plus $1. handling charge ..... $_____

**Plus my state sales tax*

TOTAL REMITTANCE ENCLOSED $_____

Mr.
Ms. _____
PLEASE PRINT CLEARLY

Address _____

City _____

State, Zip _____

All orders are subject to acceptance

Lights gleam from Buckman's Tavern beside Lexington Green. Here minutemen cooled heels.

Buckman's laid out food and drink as townsmen waited for the redcoats into the wee hours.

200 years ago this month: final installment

By Edwards Park

A single shot on a spring day starts *the* war

First blood is spilled on a village green
as years-old tensions finally explode.
So ends the prelude to our Revolution

Northwest of Boston, the land lies flat along the Charles and Mystic Rivers until, at the village of Menotomy, it rises suddenly. It remains level, however, until beyond Lexington. Then begin a number of rocky ridges, plowed aside by ancient glaciers, that stretch to the hills of Concord.

General Thomas Gage, Royal Governor of Massachusetts, has Concord on his mind as the winter peters out, surprising everyone with its lack of severity. Gage knows that this spring he must end the growing rebellion in Massachusetts. Spring is the time to move troops, and troops must be used to clamp down on the insurgents. Once that's done, then surely the Ministry will make concessions to salve bruised feelings and restore the Colonists to serene loyalty. Gage is most anxious for this to happen. He likes Americans.

To speed this happy prospect, Gage decides to send a force to Concord to seize military supplies. Concord is the current seat of the Provincial Congress, an illegal body which seems to have more authority over the Colony than Gage does. It is a stronghold of insurgency and also a convenient distance from Boston—21 miles if you march out Boston Neck, 16 miles if you take a shortcut by crossing the mouth of the Charles to Cambridge. When, on the 16th of this month, Gage gets a four-month-old letter from Lord Dartmouth, Secretary of State, warning him that the King wants the rebel leaders arrested, Gage simply nods in partial agreement. He has already laid plans to send all his grenadiers and light infantry to Concord on the night

A minuteman's view of Lexington Green on an April dawn shows where the British force came into sight and spread out. Behind them lay Menotomy—today's Arlington. Ahead was Concord.

of the 18th. If they happen to scoop up Sam Adams and John Hancock, the two leading revolutionaries, so much the better.

Adams has been suffering lately from the sick feeling that his revolution is withering on the vine. Boston is being strangled by the British; its anger should be at flash point, but what with the advent of spring and the flow of supplies from other Colonies, no one seems to want to go to war anymore. People are more interested in spring plowing and courting in the moonlight while the peepers sing in every April puddle. The Provincial Congress has been a waste of time. Many of its members have been claiming to have spring colds so they don't need to show up.

With Adams is young John Hancock, rich, spoiled, elegant, shallow and utterly political in all his motives —but vastly useful to the cause. They are staying at the Reverend Jonas Clarke's parsonage in Lexington because Mrs. Clarke is Hancock's cousin. It's crowded but convenient—only a six-mile ride to Concord.

Adams adjourns his congress on the 15th. Next day Paul Revere rides out from Boston bringing the news that the British troops are doing some suspicious things.

Gage has 11 regiments in Boston; each has a company of grenadiers and each is supposed to have a company of light infantry, though one company hasn't arrived. He calls for these special companies to stand down from regular duties and alerts the transports in the harbor to ready their longboats for a little ferrying. Colonel Francis Smith of the Tenth Regiment is put in command of the Concord expedition—a stout man with a well-earned reputation for being slow to move. Seconding Smith will be Major John Pitcairn of the Marines, also stout, but quick and decisive. He is a decent man, well liked by the Americans as well as his own men.

On the 18th, Gage sends a group of his bored young officers for a ramble in the countryside, out toward Concord. They are to wear side arms, but must conceal them under their cloaks, for off-duty officers must not bear arms by special order. They are to watch for signs of insurgent activity—heavily loaded wagons, groups of men on the move, that sort of thing. Gage stresses the need for secrecy. He is annoyed when his

Photographs by Ross Chapple

Candle inside Lexington's Hancock-Clarke House recalls lights that were lit to greet Paul Revere.

Door of Jonathan Harrington's house in Lexington, where he crawled to die at the feet of his wife.

brigadier, Hugh, Lord Percy, a popular young colleague, reports that the news of a march on Concord seems to be the gossip of Boston. Too late now. The fat's in the fire.

At ten P.M. on the 18th, some 700 light infantrymen and grenadiers assemble and march quietly down to the riverfront. They must wait a miserable length of time for Smith. Then they cross the Charles and reassemble in the Cambridge swamps. Again they must wait, two hours up to their knees in a marsh, for rations which they do not want. At about two A.M. they march off very quietly up to Menotomy (which one of their officers insists upon calling "Anatomy"), and on toward Lexington. They are wet, disgusted and cynical about the loss of secrecy, for all about them in the dark, bells are ringing and distant muskets firing. They are also overjoyed at being out of Boston and headed for adventure in the soft countryside, with a bright moon above.

Revere has been responsible for spreading the word, (SMITHSONIAN, April 1973), but he's almost too far ahead of the British. He arrives in Lexington at about the time the troops are standing in the mud. Swinging up to the Clarke house, he finds the lights out and a militia guard outside telling him to cut out the noise.

"Noise!" says Revere, "You'll have noise enough before long. The Regulars are coming out!"

Clarke sticks his head out of the window to see what the fuss is about. Revere won't talk to him. His message is for Adams and Hancock, and he is too tired and tense to take any nonsense. And then Hancock's voice comes from inside: "Come in, Revere; we're not afraid of *you*." Half an hour later, up rides Revere's friend Billy Dawes, who took the long route from Boston with the same message. They have a drink inside while couriers rouse the minutemen and Captain John Parker comes in for a briefing.

The minutemen assemble, then are dismissed and kept on call, for there's no sign of the redcoats. Many walk from the green over to Buckman's Tavern, beside it, and toy with a pot of rum to still the quiver in their guts. At about dawn someone gives a shout and they all hurry out to the green again and form a ragged line —60 or 70 men. Townsfolk gather in excited throngs around the green.

Eastward, where the road approaches from Boston, the sky lightens and a fat spring robin shouts from the tree beside the meetinghouse and its adjacent belfry. And then, incredibly, the whole eastern view seems filled by a rippling mass of black caps and shiny, swaying bayonets. The scarlet jackets look dark in the

Boston-born Edwards Park of SMITHSONIAN *was raised on tales of the Battle Road herein described.*

dawn light as the mass comes nearer. There are so many, so very many. The men on the green catch their breaths and swallow dryly.

Officers on horseback ride forward and the minutemen hear confused shouts to lay down arms and disperse. Parker turns and says something; the men near him begin moving off the green, still carrying their guns. There are more shouts—then, with awful clarity, the sound of a shot. No one can tell where it comes from, but it is followed by other scattered shots and then the dawn is ripped by a red gout of fire and the crash of a military volley. And suddenly everything is over for eight Americans—and for all the hopes of peace that Gage has had, that Benjamin Franklin has had, that the Earl of Chatham has had, that Thomas Jefferson has had, that George Washington has had, that King George III has had.

The British officers, appalled, whirl their horses around and make the slashing downward saber stroke that signals "cease fire," but the light infantrymen are out of hand, charging in now with bayonets. When finally they are brought to order, they shout a huzza, giving voice to all the frustrations and insults they have suffered in Boston. They form and swing off on the Concord road as the grenadier companies, coming behind, reach the green.

There, a young man crawls the 50 yards to his own doorstep and as his wife opens the door he looks up at her and dies. And an old man sitting on the wet sod, his musket half reloaded, slumps forward, his insides torn apart by a bayonet. Silent with shock, the villagers move among the bodies. Sam Adams, hastening to safety with John Hancock, savors the distant sound of musketry. "What a glorious morning this is," he exclaims.

The militia and the British parade in tandem

Glorious it is, in a simpler sense than Adams means, for the sun is up on a warm, bright day. The Regulars, stepping out for Concord, can forget silence and secrecy, for the cat is well out of the bag. The fifer and drummer for each company move forward, and sprightly tunes lift tired feet and remind all ranks that they are elite troops of the world's finest army. Fifers and drummers wear regimental colors in reverse—where the Tenth Regiment wears scarlet coats with yellow facings, the Tenth's bandsmen wear yellow with scarlet facings.

Concord's men have been alerted for hours, and the supplies are well hidden. But the persistent rumor of real gunfire in Lexington is worrisome. So down the Lexington road march some 200 Concord men, muskets and fowling pieces aslope, powder horns dancing on hips as the fifer and drummer give them the impudent tune of *Yankee Doodle* to keep them in step. They round a bend—and there ahead is a great waving column coming right at them, white breeches flashing in the sun, metal buttons gleaming. The front ranks are a brilliant array of yellow coats, buff coats, black coats, blue coats, all with scarlet facings, and behind come file after file of scarlet. With enormous sangfroid, the militia executes an about face and heads back to Concord, the fifer still playing, and 200 yards behind them, the British musicians come to life and pick up the American tempo with a sudden shrilling of fifes and deep bellow of regimental drums. "Grand music," a Concord corporal notes wryly to himself.

British command took over Wright Tavern in Concord as grenadiers searched the town for supplies.

The Americans keep to the heights around Concord while the British enter town and set about their search for stores. Grenadiers do the work, hulking men being very careful not to cause trouble after the bad business in Lexington. They miss most of the supplies, allowing themselves to be chivied off by vociferous old women brandishing brooms and screeching imprecations. But they find some gun carriages and set them afire. And that causes a lot more trouble.

For the Americans have by now gathered on Buttrick's hill, overlooking the North Bridge over the Concord River. There are about 400 of them—the Concord men and newly arrived minutemen from Acton, Bedford and other neighboring towns. Facing them, guarding the bridge, are three companies of British light infantry. Three other companies have moved on to search out more supplies. When the smoke of the burning gun carriages rises above the bare trees toward town, the Concord men think their homes have been set aflame. Cursing and pointing,

Concord River, then lower than in most Aprils, was flicked by warning bullets as militia advanced.

they start toward the bridge, half running down Buttrick's hill. They far outnumber the three British companies (there are about 28 men to a company), and the British prudently scurry back across the bridge and take up a formation for street fighting wherein one rank can fire, then move aside and form again in the rear while the next rank fires—and so on. A couple of redcoats dash back to the bridge and begin tearing up the planking. "Stop doing that to our bridge!" shouts Major Buttrick, and the British look up, abashed, and obediently trot back.

By now the Americans are swarming down toward their end of the bridge, tramping through the low ground where the river always floods in April—except in this year of the mild winter. British officers shout at them to halt, and a few pistol bullets strike the water as they fire to the side to deter the Americans. It doesn't work. The militia are almost on the bridge now, and an order rings out clearly from the other side. Then there is that awful rippling blast of dark flame and white smoke as the leveled Brown Bess muskets of the front rank discharge their volley. A couple of the Americans spin back and drop soddenly, and a high-pitched voice shouts "Fire! For God's sake, fire!"

And then, without much order, some 400 muskets and fowling pieces and even a few rifles open up with a rolling roar. Splinters fly from the bridge; twigs bearing April buds spin down, clipped from branches and bushes. Reeking smoke hides the scene and when it clears off the Americans gape at the backs of those scarlet coats, bobbing away toward town. The Americans cross over and look down at a few sprawled bodies —their own king's troops. One badly wounded soldier, trying to crawl away, is seen by a dim-witted country lad straggling behind the main body of Americans. The sight so shocks the poor rustic that he smashes at the man's head with his hatchet as though trying to drive away the horror. Of course, when the three foraging light infantry companies cross back over the bridge some time later, they note the grisly sight and report that Americans are scalping and gouging their victims.

It is apparent to Colonel Smith that April 19 is not his day. He and Pitcairn assemble their forces and start back toward Boston. They are aware that armed men are lining the ridges beside the road, but they have long ago sent back to Boston for reinforcements and they feel they can extricate themselves from this mess without too much trouble.

They can't. The men on the ridges leave the British alone at first, as the red column starts back. The Americans have had a bellyful of violence, this bright spring day, and they don't really want any more. They just want to make sure the redcoats get out of town. But every minute, now, new militiamen are arriving over hills and across fields. They wear scraps of old provincial uniforms—or simply farm smocks and perhaps worsted caps. They carry muskets their fathers used in the French wars, 20 years ago, and pouches where shot mingles with slabs of salt pork and hunks of cornmeal journey cake (johnnycake). They have all heard vastly exaggerated tales of stand-up battles with the redcoats ending in splendid triumphs for the militiamen. They want to get into the action. When they reach the Concord ridges and look down at the weary

From stone fences along the Battle Road, Americans poured a withering fire into the British column.

red column trudging homeward, they find it the most natural thing in the world to snuggle down behind a rock and squeeze off a shot.

Galled by this firing, the grenadiers often halt, face right and left and slam out a volley in return. But they have few targets and, anyway, their technique is not to aim particularly, but to fire forward and so lay down a curtain of lead—most effective in open country where European wars are fought. But this is rough terrain, and Americans know nothing except a smattering of the Indian tactic of hide-and-snipe.

The first road junction east of Concord is called Meriam's Corner. Here the Colonials are lying in wait for the British, and a hail of musketry pours in. Tall grenadier caps fly in the air as men sag and topple on the road. Americans following behind find puddles of blood in the ruts.

Tired though they are, the British light infantry companies spread out to do their job—to sweep the flanks of the main column, flushing ambushers like partridges. And American losses begin to mount, for light infantrymen *do* take aim when they come up on their quarry. When the ridges taper off into the level land west of Lexington, the Americans begin hiding in houses and barns beside the road. And the light infantrymen smash their way in and shoot at everything that moves, then set fire to whatever will burn.

Yet as the day wears on, exhaustion becomes the chief factor. Some British troops now straggle, risking death or capture rather than driving their aching bodies any longer. Colonel Smith is wounded, but cannot sit his horse because he is too tempting a target. He hobbles along in the ranks. Major Pitcairn's horse has bolted toward the Americans, carrying his fine brace of pistols in the saddle holsters. The Americans gratefully liberate them.

By the time the column reaches Lexington, the end is in sight. The flankers have pulled in, too tired to maintain the dogtrot that is required of them. Most men don't even pause to shoot back at the incessant fire from the flanks. Some break ranks and run blindly until they drop. As they hurry past Lexington Green, no one gives it a second look or a thought of the little skirmish at dawn that started the big day.

And then there is, for the beleaguered British, a wonderful sound—the buzzing whirr of a cannonball over their heads and the smash of planking as it rips into the meetinghouse, sending a party of Americans scampering for their lives. Ahead, the road is filled with fresh redcoat ranks. Lord Percy has arrived with the reinforcements.

Smith's men run for safety and drop gasping to the ground. Percy's two cannon bellow irritably to keep pursuers at bay. Debonair as ever and now very much in charge, he turns Munroe's Tavern into a hospital, fixes his lines so the routed units can get some rest, then gets the whole outfit out on the road to Boston.

The march to Boston becomes more of the same until even Percy's reinforcements are exhausted by the galling fire from hidden farmers. As day fades, the whole contingent darts over Charlestown Neck and sprawls on the grass, under the protection, at last, of the guns of the anchored men o' war in Boston Harbor.

All around the town, myriad campfires spark to life in the twilight as the Americans sizzle their salt pork and warm their johnnycake for supper. Clearly, they don't intend going home just yet.

Propaganda war begins

And so the long day of April 19th ends. The British have suffered 73 killed, 174 wounded and 26 missing, which indicates that the Americans, outnumbering them about four to one and, shooting at them from concealment all day, scored only 247 hits. The Americans have lost 49 killed, 39 wounded and 5 missing. No sooner is the shooting over than the propaganda war begins, both sides trying frantically to prove that the other side started it. The Americans are quicker with statements and couriers than are the British. The news (properly slanted) is in New York by the 23rd, in Philadelphia a day later. Minutemen keep

arriving outside Boston. There are some 20,000 by the 20th, including Israel Putnam, a garrulous old veteran who actually leaves his plow in his Connecticut field in order to make the scene, and a party of New Hampshiremen who march 55 miles in 18 hours. The Provincial Congress meets in Watertown to appoint Artemus Ward commanding general. He is a nice man, but too fat to mount his horse. Putnam is made his second in command.

The news reaches Mount Vernon on the 28th, and George Washington adds it to the more local tidings of what has been happening at Williamsburg. For on the 20th, a group of Marines from a ship in the James River slip into the powder magazine in dead of night and make off with 15 half-barrels before the watch discovers them. Lord Dunmore, of course, is behind the raid, and the villagers are barely dissuaded from storming the governor's palace. Instead, they politely protest, and Dunmore replies that he's going to arm the slaves and burn the town. This stirs up the Virginians so that some 600 men are ready to march from Fredericksburg and get the powder back. Washington and other moderates cool these hotheads, but news of Concord and Lexington sends Patrick Henry off on the kind of glorious crusade he's been looking for. With 150 volunteers—who have to listen to a formidable amount of fiery oratory as part of the terms of their service—he marches on Williamsburg. Once more cooler heads prevail. Henry is persuaded to accept, on behalf of the Williamsburg townsfolk, a government payment for the powder and dismiss his expedition.

Even among people who have heard the news from the north, there is a feeling of unreality, a sense that life will go on despite the bloodshed in Middlesex County, Massachusetts. In Philadelphia, it is easier to read Tom Paine's generalities in *The Pennsylvania Magazine* or *The Pennsylvania Journal* than the specifics from Massachusetts. Last month Paine wrote an article damning slavery. This month, partly as a result, the American Antislavery Society is formed.

Out in Kentucky, Daniel Boone this month founds Boonesborough and some other settlements in the wilds beyond Cumberland Pass. Concord and Lexington are far, far away.

As the month ends, John Burgoyne, the King's general who faced overseas duty with so many moral misgivings, finds himself pacing the deck of H.M.S. *Cerberus,* bound for America with his fellow generals, Sir Henry Clinton and William Howe. Burgoyne has left a note to be opened by King George upon news of the general's death. In it, he seeks royal protection for his beloved invalid wife, Lady Charlotte. He doesn't seem too sad about his posting now, however. He and the other two have got the frigate laden down with boxes of food and cases of wine.

Benjamin Franklin is also on the Atlantic as the month closes. He is headed home at last, his years of service in England, his dreams of having a direct role in building a British Empire to the Pacific all finished, hopeless. With him, aboard *Pennsylvania Packet,* is his grandson, William Temple, the bastard son of William Franklin, Benjamin's firstborn.

In France, this month, the king's Foreign Minister, Charles, Comte de Vergennes, writes a letter to Pierre Caron de Beaumarchais, a strangely powerful court figure who began his career as a watchmaker. Beaumarchais is to get a million livres from France and an equal sum from Spain, and with it he is to start a private commercial firm "at your risk and peril" and begin supplying the Americans with arms.

They need all the help they can get. In Cambridge, where Ward's "army" is encamped, there is a miasma in the spring air. Camp kitchens, slaughter pens for cattle, latrines, graves—all are inextricably mixed. Food is terrible, illness is rife, discipline is almost absent. Men who elect their own officers do not expect to have to obey them against their wishes—and the officers are well aware of the best way to get elected. So there are no great demands put on the soldiers, no punishments. They come and go as they wish. But, oddly enough, there are always enough of them there, ringing the city of Boston, to keep the British inside. As every day passes it becomes more obvious that, just as Sam Adams and Dr. Joseph Warren are saying, a war of sorts has indeed begun.

With the raising of the curtain, the prelude to the Revolution is over. Now at last we can end our pretense at direct involvement with the 18th century and step back to the 20th with its convenience of perspective. We know that the bumbling, awkward start that was made that April resulted finally in victory. We can

even understand why, thanks to other events in our more recent history that seem to prove that consistent guerrilla pressure cannot be stamped out. We have seen England learn it, Germany, France—we have learned it ourselves.

We have been concerned, however, with the start of the American Revolution, not the outcome. And there is one point about the start that still titillates us, despite all our sophisticated knowledge and perspective: Who really *did* fire the first shot—the "shot heard round the world"?

Let's recapture the scene: the minutemen on Lexington Green, tense and frightened; the advance detachment of light infantry marching up, halting, forming a broad front to cope with whatever these yokels think they will do about it. Both sides are at the psychological point where they will pull a trigger. But consider yourself one of the minutemen. Would *you* deliberately aim and fire at that great scarlet array with all those gleaming weapons ready to give it right back to you? Now consider yourself an infantryman. Would *you* take it upon yourself to cut loose, all alone in the ranks, your single shot ringing out with nightmarish clarity, the prospect of some savage company punishment firmly in your mind?

Yet what if you were a laggardly militiaman who had dawdled too long over your rum to make it to the green on time? What if you went to an upstairs window of Buckman's Tavern, your musket loaded and primed, and peered out at the scene below—the line of citizens on the green, the ranks of soldiers facing them, the onlookers along the sides, the officers prancing up on their horses, calling out for dispersal? Your shot, you think, might start something very good. Anarchy sometimes seems attractive from afar. It's obvious to you that war is coming, so why not be a hero and kill an officer?

So you aim and fire—and miss. And in a moment you see eight fine men dead on the green, so you decide to shut up about it. Then, later still, Mr. Adams and Dr. Warren make it perfectly clear that the British started the war, so you carry your little escapade to the grave with you.

There is another possibility. The young British officers on that expedition had been cooped up all winter and were desperate for action. Here, in the half-light at Lexington, they saw a chance for it and mounted officers probably drew their pistols. How easy, then, to cock one, to grip it too hard as you yank it from its holster, to loose a harmless shot at the ground. Gunsmiths say that a well-worn flintlock could go off from the presumably safe half-cock position of the hammer. The war could have started by accident.

Among the already old headstones on Concord's burial ground hill, militia gathered to watch British.

First shot was inevitable

It really doesn't matter. If the first shot had not been fired at Lexington, it would almost certainly have rung out at Concord. If it had not been fired on April 19, it surely would have been at the next confrontation. And if that had occurred in May, this column would have continued for another month.

For the spring of 1775 dawned on a mood of deep conviction shared by a considerable number of people —not everyone, but enough to produce an army of sorts along the Battle Road between Boston and Concord. The people whom we call forefathers were not unlike us—perhaps a bit simpler, a bit more ready to accept bad along with good, to relish their pleasures and yet still suffer for their beliefs. They were the sort who would, with quiet assurance, leave the laughter of the tavern and take their places on the village green in the waiting silence.

Old North Bridge,
where "embattled farmers"
defied an empire.

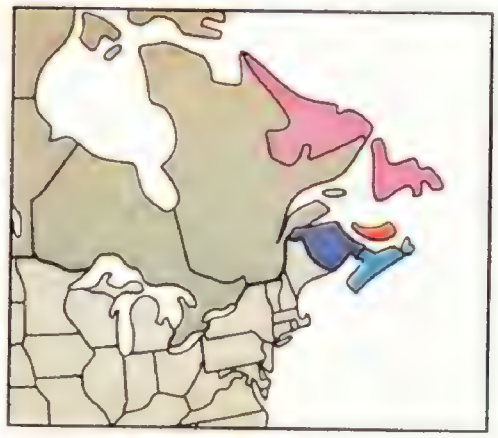
Canada
This summer.

〈 Tear-out vacation supplement 〉

Atlantic Canada. It lives to the rhythm of the ocean tides.

The provinces of New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland have a lot to share with you.

An ocean that was made for all kinds of fishing. Long, sandy beaches that were made for swimming and basking in the sun. Thousands of miles of beautiful coastline and unspoiled countryside. A summerful of Highland gatherings, Acadian French soirées, lobster get-togethers and old-fashioned fun.



Canada's four Atlantic Provinces

All over Atlantic Canada, you'll meet people whose lifestyle has stayed close to their maritime heritage and hasn't changed much in generations. Atlantic friendliness will welcome you wherever you go.

So come on, America. Come see life the way it is in Atlantic Canada.

New Brunswick.

A picture postcard province.

New Brunswick borders on the State of Maine, so it's the province that most Atlantic Canada visitors see first. Nor could there be a better place to start. With the ocean for a neighbour on three sides, New Brunswick has sweeping, sunny beaches to show you, bustling fleets of fishing boats and an Acadian French culture that's as old and as colourful as the history of this continent.

So don't drive too fast.

Spend some time exploring the Bay of Fundy shore, where the high tides have carved incredible shapes into the sandstone cliffs. Visit the Fundy Isles of Grand Manan, Deer and Campobello, where Franklin D. Roosevelt's old summer home sits in the middle of a beautiful International Park. See the 1812 timbered blockhouse and shop for homespun tweeds at historic St. Andrews-by-the-Sea.

Further along the Bay of Fundy coast is the city of Saint John, which was founded in 1631 but didn't really develop its own special character until after 1783, when 4,200 United Empire Loyalists arrived from New York and Boston, refugees from the turmoil that followed the War of Independence. Walk the 'Loyalist Trail' through Saint John and you'll see something of the city they built, or plan your visit for the last week in July and help Saint John celebrate the event with Loyalist Days parades, concerts, sailing races and feasting. As an American, you'll be more than ordinarily welcome, because this is one of many Canadian celebrations that link your history with ours.

If you follow the Saint John River upstream for a hundred miles, you'll come to Fredericton, the provincial capital, a gracious city of tall elms and church spires, statues and elegant Victorian homes. Fredericton has professional theatre at the Playhouse, an art gallery (the Beaverbrook) where you'll find major works by Gainsborough, Reynolds, Krieghoff and Dali, and the loveliest university campus in Canada. Shop for pottery and woven fabrics in the many quality craft studios, and visit nearby King's Landing Historical Settlement, where you can see village life the way it used to be in this part of the world between 1790 and 1870.

If you're a sportfisherman, you'll already know that New Brunswick offers some of the best fishing on the continent. If you're a salt-water enthusiast, you'll probably make a bee-line for the coast where you'll find deep-sea fishing boats, tackle and expert advice readily available in many of the fishing villages. Care to take on a tuna?

You'll also find the delightfully friendly descendants of New Brunswick's earliest settlers. The Acadian French they speak is older and markedly different from the French spoken in Paris or Montréal, but there's no mistaking the genuine warmth of their hospitality. They'll gladly tell you the secrets of their gourmet seafood recipes, and you'll be a very welcome guest at festivals and celebrations all around the coast.

There's the Scallop Festival at Richibuctou in early July; four days of feasting and partying at the Shediac Lobster Festival in the middle of the month; and an Acadian Festival of folk songs, dances and seafood at Caraquet, scheduled for August 9-17.

They're all much too good to miss.

Dig for clams at Buctouche, N.B

King's Landing Historical Settlement

While you're inland, enjoy the peaceful scenery of famous rivers like the Miramichi. On the coast, enjoy great ocean fishing for cod, mackerel, pollock, stripers and tuna.

What to do in New Brunswick's cities.

In Saint John: Follow the 'Loyalist Trail' past the city's oldest buildings. Stroll through the Old City Market. Swim, fish, boat, hike in Rockwood Park. See the Reversing Falls. (The Fundy tides are so high that the St. John River actually changes direction.) *In Fredericton:* Visit the Beaverbrook Art Gallery. Check the summer program at the Playhouse. Walk through the university campus to Poet's Corner. Visit the Legislative Library to see the rare and priceless Audubon bird paintings and a 1783 copy of the original Domesday Book. *In Edmunston:* Tour the Cathedral of the Immaculate Conception and see the LaPorte Museum of St. Louis College. *In Moncton:* Coast your car up Magnetic Hill. Visit the Acadian Museum at the French Université de Moncton. Join in a community service at the Free Meeting House. *In Campbellton:* Climb Sugarloaf Mountain. See artifacts recovered from the French fleet sunk during the Battle of Restigouche. *In Bathurst:* Charter boats for deep-sea fishing and sightseeing. Ride or hike along the Nepisiguit River to the Pabineau Falls which thunder down a giant granite staircase.

National parks.

Fundy National Park. On the Bay of Fundy, east of Saint John. Nature trails, golf, tennis, open-air theatre. Accommodations range from motels, lodges and chalets to serviced campgrounds.

Kouchibouguac National Park. On Northumberland Strait. Quiet lagoons and bays. 15 miles of offshore sandbars. Camping only.

Camping and public beaches also available in most provincial parks. Write the Department of Tourism (address below) for location and details.

Major Festivals.

Bon Ami Get-Together (includes Indian and French events), Dalhousie, mid-June. Salmon Festival, Campbelltown, July 1-6. Scallop Festival, Richibuctou, early July. Lobster Festival, Shediac, mid-July. Loyalist Days, Saint John, late July. Woodstock Old Home Week, late July. Acadian Festival, Caraquet, August 9-17. Frontier Days, Fredericton, late August.

Where to stay and what to pay.

Hotels and motels in the larger centres from $15 to $35. Out-of-town motels less. Guest homes in many small towns and villages from $7 per night per person. Some farm vacations available from about $70 per week per person including food. Camping in most parks from $3 to $4.50 per night. Full information from New Brunswick Department of Tourism, Dept. CG2, Box 1030, Fredericton, New Brunswick, Canada.

Prince Edward Island.

A million-acre farm with beaches.

You can travel to Prince Edward Island by ferry from Cape Tormentine, New Brunswick or Caribou, Nova Scotia. Or you can jet directly to Charlottetown, the capital.

P.E.I. is 140 miles long and averages 25 miles in width. From the air, it's a green-and-brown patchwork of farms, bordered by miles of sand beaches. On the ground, everything (with the possible exception of the horses at Charlottetown and Summerside race tracks) seems to move at half-speed. There's no rush or hustle.

Charlottetown is a city of art and culture, steeped in Canadian and American history. It was officially founded in 1763 and unofficially invaded by two American privateers in 1775. They captured the Attorney General, who was later returned, and the Great Seal of the Colony, which was not. (If it should happen to turn up in your attic, the P.E.I. Government would be happy to hear from you).

If you plan your visit for August, you'll find a special program of theatre presentations (part of the Charlottetown Festival) at the Confederation Centre of the Arts. But whatever time you come, you'll find a crowded schedule of summer celebrations on the Island — popular ones like the Lobster Festival at Summerside and the Fisheries Exhibition and Regatta at Souris, as well as dozens of friendly country socials where you can sample the Islanders' home-baked pies and old-world hospitality.

You will also find miles of

Reel in the big ones off North Lake Harbour, Prince Edward Island

magnificent beaches, washed by the warmest salt water north of Florida; seaside towns where you can shop for local crafts and charter boats for deep-sea fishing; and some of the most challenging golf courses in North America.

Many of the Island's tuna boats are berthed at North Lake Harbour and other Island harbours. You don't have to be an expert or wealthy fisherman to enjoy the sport. The $100-a-day charter fee for a party of six includes bait, tackle and all the expert advice you can handle.

If you'd really like to get to know the Islanders and to find out something about their way of life, plan to stay on a P.E.I. farm for a day or a week. You'll sleep in the farmer's comfortable guest room, eat hearty meals at his table and (if and when you feel like it) lend a hand with the chores. Many farms offer extras like baby-sitting service, riding horses and packed picnic lunches and all of them have special rates for children. But the "extra" that really counts is conversation with the farmer and his family—the still summer evenings spent rocking on his porch, seeing the world through his calm, shrewd eyes.

What to do in Prince Edward Island.

In Charlottetown visit beautiful St. Dunstan's Basilica, and historic Province House (where Canada's founding fathers met). Tour the city on a London bus, in a horsedrawn carriage or on foot. Go to the races. Drive to the Acadian Pioneer Village at Mount Carmel, visit Anne of Green Gables House in Cavendish or drive to Green Historic Park and learn how wooden ships were built 100 years ago.

National parks.

Prince Edward Island National Park. 25 miles of sandy beaches along the Gulf of St. Lawrence. Golf course, nature trails, fresh and salt-water fishing. Lodges, motels, cabins and tourist homes nearby. Trailer parks and campgrounds in the park.

Camping and trailer facilities at privately-operated locations and in many provincial parks. Write the Tounst Information Division (address below) for locations and details.

It's both a unique vacation experience and a beautiful way to take a break from big-city life.

Major Festivals.

Charlottetown Summer Theatre, featuring "Ann of Green Gables", throughout July and August.

Lobster Carnival, Summerside, July 18-26.

Potato Blossom Festival, O'Leary, July 31-August 3.

Old Home Week, Charlottetown, August 6-16.

Prince County Livestock Show, Alberton, August 22-23.

Acadian Festival, Abrams Village, August 29-31.

Highland Games, Eldon, August 2.

Where to stay and what to pay.

Hotel and motel prices in Charlottetown, Summerside range from $20 to $30. Cottages available in most resort areas from $100 to $200 per week, depending on size and location. Farm vacations from $50 to $75 per week per person. Camping in the National Park, most provincial parks and at privately-operated locations from $3 to $5 per night. Complete information from: Tourist Information Division, Dept. CG2, P.O. Box 940, Charlottetown, P.E.I., Canada E3B 5C3.

Fine dining is the rule and at least one hearty lobster meal, with all the trimmings Atlantic Canada style, is a must

Native artifacts and local arts and crafts make great take-home gifts. Find them at galleries, and handcraft shops like this one at Mahone Bay, Nova Scotia

Nova Scotia.

Pipes skirl and highlanders dance at the Antigonish Highland Games, Nova Scotia

Parts are more Scottish than Scotland.

You'll feel the strength of the Scottish heritage over most of Cape Breton, where Gaelic is still a living language, and in Pictou and Antigonish counties, where the clans gather every summer for traditional Highland Games and Festival. And you'll understand why the Scots fell in love with Nova Scotia, when you drive around Cape Breton and the magnificent Cabot Trail. The spectacular seascapes and the timbered mountains of Cape Breton Highlands National Park are uncannily like the home they left.

Stop at Ingonish to play the superb Cape Breton Highlands Golf Links and to sample the fishing; at Iona to visit the Highland Village Museum; and in the beautiful Bras d'Or Lake area for sailing, beaches, and a visit to the Alexander Graham Bell Museum, packed with models and drawings of his many inventions.

Stop, too, to see the great Fortress of Louisbourg. The French began building it in 1720 (long before the Scots arrived) and by the time they were finished it was a 100-acre walled city. Louisbourg was twice captured and finally demolished. Now, with the original plans as a guide, it's being carefully rebuilt. You can tour the sumptuously-furnished Chateau, visit the museum and watch archeologists digging in the ruins of buildings not yet restored.

The British built the Citadel at Halifax to offset the French power at Louisbourg. It sits 270 feet above one of the world's great harbours (which you can cruise on the schooner Bluenose II) overlooking a city that's as famous for its gourmet seafood as it is for its delightful parks, its fine museums and art galleries. Halifax is the capital of Nova Scotia, and together with its sister city of Dartmouth is the largest metropolitan area in Atlantic Canada. But in spite of its commercial importance, its bright lights and busy nightlife, it's managed to retain a good deal of small-town charm. You can hear band concerts in the tree-shaded Public Gardens and a booming cannon that's marked the noon-hour every day since 1749. And you can picnic, swim and hike miles of nature trails in a downtown paradise called Point Pleasant Park.

Feel the past at Fortress Louisbourg, where the British and French battled for control of the Atlantic coast

Close to Halifax is Peggy's Cove which may qualify as the most photographed and painted village on the continent. A little further along the coast is Oak Island (near Mahone Bay) where people have been searching for Captain Kidd's legendary treasure since 1796. (You can tour the Island and see the old and new diggings.) Further still is Lunenburg, which was settled by Swiss and German immigrants and became the most famous shipbuilding centre in the New World, and Shelburne, founded in 1783 by a group of United Empire Loyalists.

The whole coastline of Nova Scotia is a fabulous holiday playground, with fine sand beaches, with delightful towns and villages where you can charter boats for sailing and salt-water fishing, with golf courses and handcraft centres, and with plenty of opportunities for exciting scuba diving in the clean, clear waters.

Inland, the rich orchards of the Annapolis Valley stretch for miles across the centre of the province. There you'll find quiet villages and historic sites, including the cannon-ringed Habitation at Port Royal National Park, a re-creation of the settlement built by the French explorer Champlain in 1605, fifteen years before the Mayflower landed at Plymouth Rock.

What to see and do in Halifax.

Take a harbour cruise on the schooner Bluenose II. It leaves from Privateer's Wharf in the old waterfront area, now restored to house boutiques, craft shops and restaurants. See the Maritime Museum and the Art Gallery, located in an old powder magazine at the Citadel. Take in a Sunday afternoon band concert at the Public Gardens. Check the summer programs at the city's three repertory theatres. Visit the Nova Scotia Museum, Province House, St. Paul's Church (the oldest Protestant church in Canada) and the little Dutch Church.

National parks.

Cape Breton Highlands. Stretching from the Atlantic to the Gulf of St. Lawrence and circled by the Cabot Trail. Fine hiking trails, interpretive program. 12 campgrounds. Resort hotel and cottage accommodation at Ingonish.

Kejimkujic. Southwestern Nova Scotia. Good fishing, boating, canoeing. Indian pictographs. Fish hatchery. Nature talks. Accommodation for tents and trailers.

Tent and trailer accommodation also available in most provincial parks. Write the Department of Tourism (address below) for locations and details.

Major Festivals.

Annapolis Valley Blossom Festival, Kentville, May 30 - June 2.

Maritime Old-Time Fiddling Contest, Dartmouth, July 4-5.

Pictou Lobster Carnival, Pictou, July 5-7 (T).

Highland Games, Antigonish, July 11-13.

Acadian Festival of Clare, Meteghan, July 12-20.

Theatre Arts Festival International, Wolfville, July 16-20.

Nova Scotia Gaelic Mod, St. Ann's, August 4-9.

Nova Scotia Festival of the Arts, Halifax, August 18-24.

Tuna Festival Week, Yarmouth, August 24 - September 1.

Nova Scotia Fisheries Exhibition, Lunenburg, September 16-20 (T).

Joseph Howe Festival, Halifax, October 2-11 (T: Tentative dates).

Where to stay and what to pay.

Halifax hotels and motels from $20 to $40. Out of town motels less. Farm vacations about $70 per week per person, $45 for children. Camping from $2 to $5 per night. For complete information, write: Nova Scotia Department of Tourism, Dept. CG2, P.O. Box 130, Halifax, Nova Scotia, Canada B3J 2M7.

Newfoundland.

The oldest part of the new world.

John Cabot landed at Bonavista in 1497, five years after Columbus found the West Indies. By the time Sir Humphrey Gilbert arrived to claim the land officially for Queen Elizabeth I, the capital city of St. John's was already a busy port, a rendezvous for the fishermen of half-a-dozen European nations. If you want to feel the strength of St. John's links with the past, go there in the spring, when the Portuguese fishing fleet sails in — just as it has every spring for more than four centuries.

Modern St. John's is well accustomed to entertaining visitors. Its stores are stocked with Newfoundland handicrafts, its restaurants with fine seafood, its museums with an abundance of treasures. The Island offers superb scenery and old-world villages, some of the finest fishing on the continent — even an opportunity to tour the remains of a settlement founded by Viking adventurers a thousand years ago.

When you go to Newfoundland, take your ears as well as your eyes. Strike up a conversation in St. John's, Ferryland, Trepassy or anywhere else on the Avalon Peninsula and you'll hear a definite Irish lilt. Do the same thing further north, in the tiny fishing villages that cling precariously to the rugged coast, and you'll hear the soft accents of Devon and Dorset, and an idiom that disappeared long ago in Britain. Bring your voice, too, because long before you leave, you'll be joining in the choruses of folk songs and sea shanties that recount hundreds of years of Newfoundland legend and history.

Explore the outport fishing villages around the island, with their brightly-painted wooden

Wade along the sandy beaches that interrupt the rugged coastline, as you drive the Cabot Trail, Cape Breton Island.

houses, neatly quilted patterns of gardens and fences and a way of life that's hardly changed in generations. Try your hand at jigging for cod. Even if you don't catch a thing, it's worth it just to listen to local yarns while the boat rides the gentle swell.

And don't overlook the interior of Newfoundland. One third of it is lakes, rivers and streams that teem with Atlantic salmon and all kinds of trout.

When you leave (by ferry from Argentia or Port aux Basques) your parting should properly be commemorated with one last chorus of "The Squid Jiggin' Ground" and one final glass of Newfie Screech, a rum with the kick of a mule. You raise your glass and say: "I looks towards ye!" and receive the response: "And I bows accordin!" In Newfoundland, there's no such thing as a stranger.

Skilled craftsmen will explain their work. The Studio, St. Mary's Bay, Newfoundland

A brave past re-lived in a Military Tattoo on Signal Hill, overlooking St. John's, Newfoundland

What to do and see in St. John's.

Walk down Water Street. It's the oldest street in North America. Climb Signal Hill to see Gibbett Hill (where malefactors once were dealt with), the Queen's Battery, Cabot Tower and the Marconi Monument, where the first trans-Atlantic wireless message was received. Visit the Newfoundland Museum and the Arts and Culture Centre, where there's a fine theatre and an excellent art gallery. See the Anglican Cathedral (1816), the Old Garrison Church (1836) and the Basilica of St. John the Baptist. Take a trip to Quidi Vidi Battery. Go to the races at nearby Goulds. Charter a boat at Witless Bay to see the bird sanctuaries or at Long Pond Manuels for tuna fishing.

National parks.

Gros Morne, 50 miles north of Corner Brook. Spectacular mountains, marvelous seascapes, fjord-like lakes and dense forests. Tents, tent-trailers and trailers.

Terra Nova, 145 miles northwest of St. John's. Magnificent fjords, long beaches, spruce forests, unspoiled lakes. Watch for bear, moose and beaver. Fine fishing for brook trout and landlocked salmon. Interpretive program. Outdoor theatre. Cottages and campgrounds, some accessible only by boat.

Camping facilities available in most provincial parks. Write the Department of Tourism (address below) for locations and details.

Major events.

Harness racing, St. John's, June through October.

Sailing races, Conception Bay, May through October.

Summer Festival of the Arts, St. John's, July.

Signal Hill Military Tattoo, St. John's, July-August.

Regattas at St. John's, Placentia and Harbour Grace, July-August.

St. John's Folkfest, August.

For precise dates and details, write the Department of Tourism.

Where to stay and what to pay.

Some luxury hotels, many good basic hotels and motels ($18-$30) tourist homes (about $8 to $10 per day per person) and housekeeping cottages ($18-$22 per day) are available. Fishing village holidays are also available — they're the Newfoundland version of farm vacations. Prices about $50 per week, all inclusive. Full information from: Newfoundland and Labrador Department of Tourism, Tourist Services Division, Dept. CG2, Confederation Building, St. John's, Newfoundland, Canada.

Photograph outport fishing villages like Hibbs Cove, Newfoundland, snuggled against the rocky shore.

The sign at the border says Welcome!

If you're a U.S. citizen or permanent resident, you don't need a passport or visa to come to Canada. But to avoid possible delays, bring something (perhaps a birth, baptismal or voter's certificate) to establish your identity.

Anything to declare?

Generally speaking, you can bring anything you need for personal use. But you can't bring things to sell. You can bring 50 cigars, 200 cigarettes and either 40 oz. of alcohol or 24 pints of beer.

Coming by car?

Bring your Motor Vehicle Registration Form or (in the case of a rented car) a copy of the rental agreement. And ask your insurance agent for a Canadian Non-Resident Inter-Provincial Liability Insurance card. You'll find unleaded gasoline available pretty well everywhere you're likely to go.

Our money versus yours.

The rate of exchange fluctuates a bit from day to day, so change your dollars at a bank rather than a store. Most of your credit cards, of course, are good in Canada.

Hunting and fishing regulations.

They vary from province to province. But you can buy licences and get all the information you need at most sporting goods stores and at all national and provincial parks.

Bringing pets?

No problem with cats, and all your dog needs is a valid rabies vaccination certificate less than 12 months old, signed by a licenced veterinarian.

Travel agents and carriers offer many ways to visit Canada, including package and group tours.

Canada

CANADIAN GOVERNMENT OFFICE OF TOURISM, OTTAWA, CANADA.

By Jack Denton Scott

Nantucket kites can fool eagles

Depression? Not for Al Hartig, who flies his products over the island harbor to proclaim that he is there and at work

Someone always shouts and points as soon as your ferry comes into view of Nantucket. Objects as colorful as tropical birds soar in the breeze above the shore. Nearing the harbor, you clearly see that one is a large red kite; the other looks exactly like a bald eagle.

Al Hartig is at it again, here on this pleasant Massachusetts island, 25 miles south of Cape Cod. From June through September, Hartig flies a pair of kites over Nantucket Harbor as a sign that his small waterside shop at Old South Wharf is open. He keeps his kites captive on 40-pound-test nylon seine line near his door latch.

An increasing number of island visitors now come to Nantucket, "the faraway land," as the Indians called it, solely to see Al, the Kiteman of Nantucket, a noted designer of handmade kites.

When I went to meet the kiteman, a drawn-looking woman and two teen-agers bearing kites were coming out. Gulls were screaming, the two kites were dancing in the sky and boats from 20 states were anchored in the marina a few feet from Hartig's door. Hartig, lank, dark, moustached, wearing his trademark—a black

Al Hartig, Nantucket's kiteman, wears characteristic derby hat in the doorway of his waterfront shop.

Photographs by Alfred Eisenstaedt

Hartig carries a pterodactyl kite—a monster with a wingspan of 14 feet. He's made only six.

derby with red band—stood at a table under a huge green pterodactyl kite jiggling in a slight breeze as it hung from the ceiling.

Al shook his head. "They saw a kite," indicating the departed customers, "flying from a boat near their yacht off Marblehead. Heard the kite came from here. So, the heck with storm warnings, they headed here to get a couple of Aces for the kids. Nearly capsized. The father is down there repairing the boat. He isn't going to be one of my greatest promoters. I told his wife, 'they're good kites, but I recommend checking weather first of all.' "

Hartig's kites indeed cause illogical actions by would-be owners and flyers. Two pretty Chinese-American sisters flew from Hawaii for the sole purpose of acquiring Hartig kites. A middle-aged man and his wife bought one, then left for Denver. They returned by private plane two days later just to have Al Hartig repair the kite they had broken the day before. Two engineers made a special flight from Maryland for kite repairs.

This doesn't please Al Hartig's sense of economy. His written instructions point out that since struts are made from dowels, they can easily be replaced, and that the cloth body can be simply repaired with iron-on tape. But a growing number of people still arrive on the island to have the master himself minister to their wounded kites.

Asked how he feels about tinkering with kites, Hartig said soberly, "You know what Churchill said about work: For every job a man has, he should have two hobbies. Well, here I am with six hobbies and no job." He arises at five every morning to enjoy the serenity of the early hours, which he uses for painting, making airplane and ship models (also sailing them), classical music, chess and, of course, kites. He is also a sculptor and carpenter, and to fill in any time left over, he makes imaginative ceramics. The morning after I met him he was in his music room listening to Beethoven from a sophisticated stereo system that he developed and working on an oil painting. He rattles off names of the artists he loves, Renaissance and Impressionist masters, and says he feels that he has something in common with all.

"We share something. . . . beauty. Or is mankind too vain? Our cats sniff the roses."

He points out that kites have been used for many purposes other than recreation—everything from helping build a railroad suspension bridge, helping make manned flight possible, studying the weather, signaling and aerial photography, to carrying weapons and even lifting military observers hundreds of feet. The man-lifting kite was a very large hexagonal one used notably by an Englishman, Captain B. F. S. Baden-Powell of the Scots Guards. A similar kite raised the antenna that received the signal of the first transatlantic wireless message—the famed "S" signal that Mar-

Jack Denton Scott is a field naturalist and author. Alfred Eisenstaedt, formerly with Life, *photographed the Shakers for* Smithsonian's *September article.*

coni sent in 1901 from Cornwall, England, across the Atlantic to Newfoundland.

Hartig says that a much more famous kite flyer than himself had an association with Nantucket: Benjamin Franklin, whose mother had lived there. He talks about one of the greatest living kiters, Harry Sauls, who invented the barrage kite during the early days of World War II. The U.S. government used the big kites to protect North Atlantic convoys, flying them on cables. They were much more difficult to shoot down than barrage balloons.

"But I'm really interested only in happy kites," Al Hartig says, as he puts away his hobbies and prepares to begin his working day at nine.

Paul Edward Garber, Historian Emeritus of the National Air and Space Museum of the Smithsonian Institution, used a Kiteman-of-Nantucket Valkyrie to raise our nation's flag to begin one of the popular annual Smithsonian Kite Carnivals at the Washington Monument grounds. As a devout kiter, it is likely that Mr. Garber had read of the official testing in the American Kiteflyers Association's *Kite Tales*. After demanding maneuvers, the Valkyrie received what

The National American Eagle lures real eagles and hawks, and once even gulled an Audubon member.

Valkyrie, with six-foot wing span and keel, is the model from which all other Hartig designs evolved.

Red Baron, sporting two German Iron Crosses, is also a tailless delta-wing kite with a keel.

amounted to a benediction from an AKA expert: "For sheer simplicity and superb flying ability, we have never seen an equal to this kite."

One of Hartig's other kites, the National American Eagle, is the most realistic bird kite I have seen, and I'm pleased to report that the severest critic of all seems to hold the same opinion. About a year after Al moved to Nantucket, he was testing an eagle, getting it pretty high over his barn, when a bird appeared high above it. It circled, getting larger, then boldly approached mere inches from the kite, obviously inspecting it. Taking its time, it then gained altitude and disappeared. Al was so excited that he almost lost the kite cord. It was a magnificent adult male golden eagle, a rare bird on Nantucket, usually stopping by only to avoid storms.

Since that day, Al Hartig has received many letters from owners of the National Eagle Kite telling of similar experiences. One kiter wrote of five hawks converging on his Nantucket kite, and Hartig himself had an interesting experience: While he was bringing his bird kite down in New York's Central Park, he also reeled in a highly agitated middle-aged member of the Audubon Society who thought that he had discovered a bald eagle in trouble.

Besides the Eagle, Al designed the Bat, also called the Flying Fox, and the impressive 14-foot pterodactyl—with only six in existence, the rarest of his kites (one has been promised to the Smithsonian). But bird kites were most difficult for him to design, for he noted that the most realistic that he saw rarely flew above 60 feet. It puzzled him. He experimented with birds and his basic delta configuration, but the more he tried to make his model look like a real bird, the less flying ability it had. After many attempts he discovered that by shaping it into a bird he was actually cutting away the forward lift area, the upper part of the apex of the triangle. He stopped cutting and filled in the forward area with clear vinyl, giving the bird lift as well as shape. Even so, it took Hartig many test flights before he was able to get his eagle to fly realistically enough to fool the real bird.

Not all his eagles flew. He likes to test them in high winds (over 20 miles an hour) in which the kites will not be flown normally, so that imperfections show up quickly. However, five of his bird kites, test-flown in the past ten years, would not perform no matter what he did to them. He believes that there may have been a faulty weave of fabric in those particular kites.

Besides the "birds," Al's high-flying Ace with a four-foot wingspan is, as he says, "For kids over six. Any younger, and the kite'll take 'em off the ground." His famed Valkyrie, with a six-foot wingspan, is the kite from which all his other models evolved. Although many enthusiasts call the Valkyrie a classic, Al says that actually he did not design a new kite at all. The

Hartig, in his Nantucket shop, has all the requests he wants. He sternly refuses to mass-produce.

delta he worked with was designed before World War I, and he merely improved upon it, simplifying so that there are no parts to lose. It is all repairable, has struts in sockets, an unbroken flight surface, and folds and reassembles in seconds. Hartig's kites are seamed where others are glued, are made of a tough cloth, 35 per cent polyester and 65 percent cotton, and have keels that stabilize and balance them, so that they do not need tails.

During a happy childhood in Clifton, New Jersey, Al Hartig was permitted to be interested in "anything that flies, sails the sea, goes into the ground or into space." He built sailing-ship and aircraft models and kites, and during World War II, while in New Guinea, extended his interests from painting posters for the PX and nameplates for officers' desks to serious stabs at art. When the war ended, this led to a course at the Art Students League in New York. After job and marriage he still found time to sail his remarkably good clipper ship models in Central Park. When a drought emptied the small lake, he went to the air with a kite.

A desire for larger air took him to the Catskills one weekend, bringing a new plastic kite. He doesn't remember how it happened, but the kite tore. He tried to repair it, but failed. Liking the kite's design, he bought dowels, red cotton cloth, a needle and thread, unfolded the want-ad section of the New York *Times*. He made what he called a half-template of a delta design. Because his new kite was of cloth and heavier than the plastic kite, he made it larger to give it extra lift. He named it Red Baron, painted Iron Crosses on it and took it out to fly. As this was the moment that changed his life, he recalls:

"The wind was about seven miles an hour on a hot sunny Monday afternoon, about one o'clock. When I released the Red Baron, to my amazement it flew gently out of my hand, showing no signs of instability. I let it go up 10, 15, 20, 30 feet, and held the string tight. The Baron then did another amazing thing I hadn't seen before. It flew straight over my head! I let out more string, another 50 feet, and held tight again. Again it rose directly overhead. My feelings were ecstatic, whatever that is. It had worked! I let out another 100 feet. It didn't rise directly overhead, but the angle was still very steep. I wished my wife Betty could see it. Everything worked that day. Betty was there in minutes watching the Red Baron way up there in the blue sky. She sat down without a word. I flew for another 15 minutes, then started to bring the Baron in.

The Baron was born

"It never wavered. It came down steadily, then at the last 15 feet it suddenly glided toward us. I took one step and gently touched a wing tip. The kite tilted, glided over Betty's head and landed on the other side of her. Baron was born!"

It was that last action of the kite that suggested to Hartig that he make the one and only change in the basic design of this kite. He felt that when a kite is flying and happens to hit an air pocket it should not glide forward continuously, since the man on the string then loses control. Being a builder of model planes, he thought the answer was a built-in stall. This could be accomplished by adding "lead" to the tail end. But he wanted to try another way, so, guessing, he took three inches off the two wing struts forward, toward the apex of the triangle. He hand-launched the kite. It sailed. That was it.

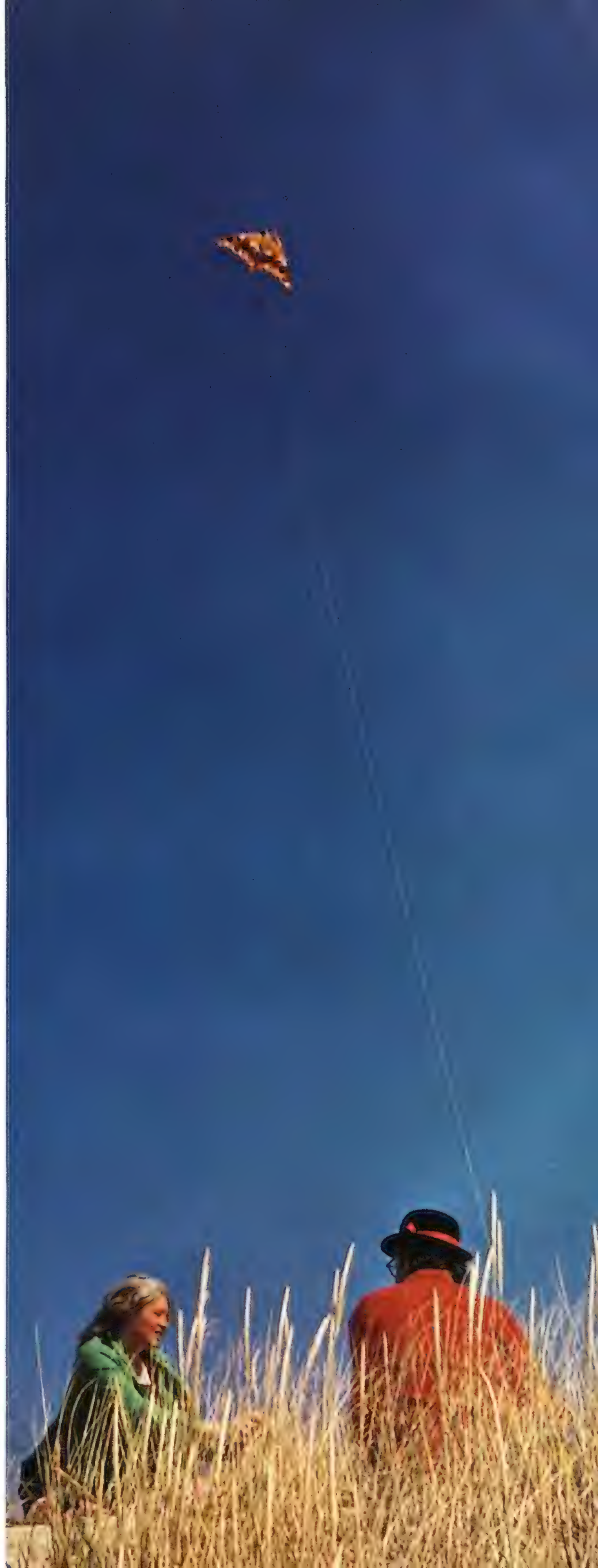
Mere months later, kind fate, which favors the Hartigs, announced that The Cloth Company of Nantucket wanted to diversify and needed a man who knew how to build kites and other "toys." Betty and Al went to Nantucket to check it out, fell in love with

the island, took the job and, despite the fact that the company soon went broke, lived happily, deciding that they would kite their way through life together.

With 25,000 handmade kites distributed to date, only seven have been returned. So far, in the decade since the Red Baron's birth, there have been some 70,000 orders for kites, which leaves some disappointed kite flyers, since only 5,500 can be produced in one year. It is all handwork; the cloth is cut from 80-yard rolls, then sewn by Betty and two helpers. Al adds brass eyelets and struts, fashioned from hand-sanded dowels. He drills holes and inserts strut threads. When they work all-out, depending upon the style of kite, they can complete four dozen kites in eight hours, if necessary. The Kiteman of Nantucket has rejected several firm and tempting offers of expansion and merger, and will not even discuss mass production.

One of his customers went to Saudi Arabia on business but forgot to take his Valkyrie, so he had one shipped there. When the kite arrived, he got into his Jeep and drove out into the desert. He opened up a big sun umbrella and put his Val aloft. Shortly after that, another Jeep drove up, a man got out and sent up his kite. They stared at one another, and at the kites, then the newcomer walked over and stood in the umbrella's shade. The first man said, "Is that a Nantucket-Kiteman kite?" The other man said it was. "Well," said the first flyer, "I mail-ordered mine from Saudi. Not many people do that." The second man said, "I mail-ordered mine from the Trucial States via the State Department. And I'm the *only* person who ever mail-ordered one from there, and now the Trucial States don't even exist anymore."

That's one-kitemanship.



The Nantucket kiteman and his wife take a busman's holiday pursuing a favorite sport in a high wind.

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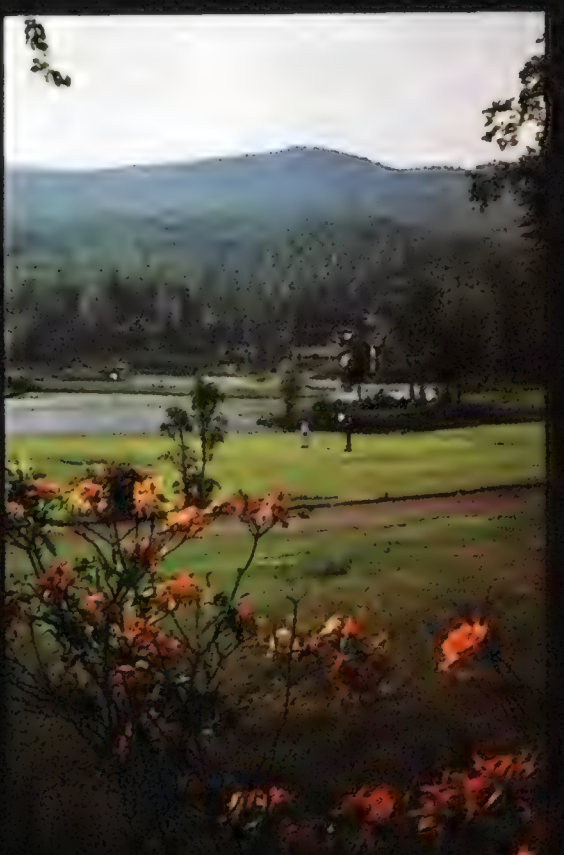

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By Timothy Green

National Trust guards everything from park to pub

Where but in Britain can you leave your estate to a conservation society and still live in it—while you get the tab picked up?

One of my earliest childhood memories is a painting of an armada of red squirrels sailing across a peaceful lake toward a distant island to gather nuts. The picture was in *The Tale of Squirrel Nutkin*, one of those enduring children's books by Beatrix Potter, written some 70 years ago. So it was a strange experience one day this past summer to learn that the lake and island depicted there were real, and to stand on that very shore of Derwentwater in England's Lake District and gaze upon the same scene virtually unchanged today (right). Even the pattern of trees on the island looked much the same as when Miss Potter drew them at the turn of the century; and a red squirrel, now relatively rare in Britain, was leaping from branch to branch through the beech trees.

That the scenery at Derwentwater and many of the other lakes nearby is still almost unspoiled today, despite a growing army of tourists, is due in considerable measure to Miss Potter's own foresight more than a generation ago, coupled with the continuing diligence today of an organization known as the National Trust. For with the profits from her children's books, Beatrix Potter purchased several thousand acres of the finest woods and mountain slopes in the Lake District, and later bequeathed them to the National Trust to guard in perpetuity. Such generosity by benefactors like Miss Potter has made the National Trust, which was founded in 1895, not just the largest private landowner in the United Kingdom, but arguably the world's greatest conservation society.

The tree-lined shore of Derwentwater, one of the earliest acquisitions of the National Trust.

Reflected in the lake is the island to which
Squirrel Nutkin sailed in Beatrix Potter's tale.

Photographs by Terence Spencer

In Blaise Hamlet this is one of ten cottages built in 1811 for the retired servants of a local landowner.

Today the National Trust owns almost 400,000 acres, embracing not only much of the finest countryside and shoreline in England, Wales and Northern Ireland (Scotland has its own National Trust), but an extraordinary portfolio of Britain's historical and architectural heritage. Its properties include some 150 country houses filled with paintings, furniture and rare porcelain; about 100 great gardens and landscaped parks; more than 2,000 farms, together with ancient dovecotes, water mills and follies; prehistoric and Roman sites; and even 17 whole villages, taken over as integral parts of large estates. Not for nothing is the Trust often dubbed "caretaker for the nation."

The diversity of its domain knows few bounds. Its mandate stretches from the White Cliffs of Dover, of which it is currently acquiring a mile-long stretch, to the graceful water meadows by the River Thames at Runnymede, where King John signed the Magna Carta under pressure from his restless barons in 1215. Off the coast of Northumberland the Trust has created a nature reserve out of the Farne Islands (p. 75), a rocky group of islets that house one of the finest seabird colonies in Europe. And its wardens are the only lookouts left on Hadrian's Wall (p. 79), that great bastion built right across northern England by the Romans in the second century A.D. to keep out the unruly Scots.

The pride of its holdings, however, are undoubtedly the country houses. "Not even the Crown at any stage of its long history, nor any equivalent organization in any free country of the world, can rival the National Trust in its ownership of great houses," wrote author and publisher Nigel Nicolson in the introduction to a section of the recently published National Trust Guide.

The collection ranges from fine Elizabethan houses like Knole in Kent and Jacobean ones like Blickling Hall in Norfolk to Petworth House, with its exquisite Grinling Gibbons carvings, and 18th-century mansions by Robert Adam like Osterley Park near London and Saltram House in Devon. "Many of these houses," Nicolson adds, "are architectural masterpieces, collectively the greatest contribution which Britain has made to the visual arts, and comparable in their sustained variety to the body of English poetry."

The Trust plays its guardian's role with a no-nonsense air. Any developers, be they private or public, who may venture to desecrate its holdings with new roads or power cables are stoutly rebuffed. As for the tenants of its mansions, cottages and farms, they must paint their homes to the Trust's conservative tastes and dispense with such 20th-century monstrosities as TV antennas. "We behave rather like a 19th-century squire," the Trust's chief spokesman, Lawrence Rich, admitted candidly. "We take over a place, look after the tenants and keep the land in good heart."

Viewing the heritage thus preserved, many people find it hard to believe that the National Trust, despite its title, is actually a private charity. The state has no hand in its running and does not finance it. "Our independence from government is the very essence of our existence," says Sir Frederick Bishop, once a private secretary to Sir Winston Churchill, who has been its director general since 1971, "for it enables us to take the long view unhindered by political changes."

Mr. Green, who lives in London, writes frequently for SMITHSONIAN. *His most recent article was on veterinarian James "Herriot," November 1974.*

The simple manor of Washington Old Hall was home to George Washington's ancestors from 1183 to 1613.

Visitors pick their way across the rocks of one of the Farne Islands, a Trust nature reserve.

The Trust depends for its survival, therefore, chiefly on the annual dues (£3, or $7.20) of its 450,000 members (more than 3,000 Americans) and the entrance fees paid by the four million people who visit its properties annually, together with a steady flow of gifts, legacies and revenue from endowment funds. "We have no regular income at all from the government," Bishop stresses. "Only about £200,000 ($480,000) of our annual £6 million ($14.4) budget comes in special grants from the state's Historical Buildings Commission and the Countryside Commission, but in applying to them we are treated like any other private owner."

Despite this segregation from government, the Trust enjoys several choice privileges not accorded to the ordinary private citizen. It is incorporated by Act of Parliament, which gives it a mandate "to promote the permanent preservation for the benefit of the nation of land and buildings of beauty or historic interest." Moreover, a crucial clause enables the Trust to declare its holdings "inalienable," which guarantees ownership in perpetuity, except by special resort to Parliament. This court of appeal has been tested only once in the long history of the Trust, when it tried (and lost) to stop a road being driven through the parkland of one of its houses.

The basic security provided by the Trust is the prime attraction to landowners, great and small, who wish to bequeath property or a fine stretch of landscape to it. The Trust also has a couple of other aces up its sleeve. The British Treasury, for instance, is prepared to accept that an estate may be given to the Trust in lieu of death duties, if it has sufficient historical or architectural importance—and if the Trust wants it. Then, another Act of Parliament allows the owner of a historic house to transfer it to the Trust, during his lifetime, together with the contents and a suitable endowment to maintain it while he *and his heirs* continue to live there.

These lifelines have saved many fine estates that otherwise might have been broken up under the auctioneer's—or the demolition gang's—hammer in an era of increasing taxation and death duties, not to mention developers' designs.

Sissinghurst Castle, with its famous garden created by Victoria Sackville-West and her husband Harold Nicolson, was acquired by the Trust in precisely this way. When she died in 1962, Victoria Sackville-West left the castle to her son, Nigel Nicolson (p. 81). "I wanted to preserve Sissinghurst intact," Mr. Nicolson (author of *Portrait of a Marriage* about his parents) now recalls, "but if I had paid the estate duties, I would have had to sell a large part of it. It would have been whittled away and eroded. So after long negotiations with the Treasury, they agreed that I could give Sissinghurst to the Trust in lieu of the tax. I also have a quite separate arrangement with the Trust that I and my heir can live here rent free. I simply pay for the internal upkeep, electricity and household decorations, while the Trust is responsible for the structure of the buildings, the six gardeners, the car parks and so forth. And, since the Trust is a charity, the £30,000 collected from visitors each year is all tax free and goes to maintain the estate."

Only the British, perhaps, could conceive such a

The forecourt at Cliveden—once the home of Lady Astor, is now occupied by Stanford University.

gentlemanly compromise in which a man gives away his house in return for the secure knowledge that it will be preserved forever, while he continues to enjoy living in it.

While the owner is thus relieved of paying bills, the Trust itself can further its philosophy that all the buildings it presides over, whether they are country mansions or simple farm cottages, should continue as family homes and not be fossilized into museums. "We want to preserve not only the fabric of buildings," the Trust's Sir Frederick explained, "but the spirit of social life within."

In choosing new tenants for its farms or cottages, for instance, the Trust gives priority to relatives of former occupants. And the reason? "We like family continuity," said Bishop.

Scores of rich outsiders do plead with the Trust to be allowed to live in the fine old houses that it restores, but unless they have some strong local connection they are usually ignored. "We could have filled every house in Lacock, a little village we own in Wiltshire, with retired vice admirals from nearby Bath," the Trust's Lawrence Rich told me, "but we prefer to let the cottages to working people from the neighborhood."

At Lacock, the Trust owns everything from the Abbey to the pub. The "olde-worlde" character of the village is treasured. Not only are individual TV aerials banned (the Trust pipes in pictures from a community antenna), but all electric cables are buried and the street lighting is discreetly hidden under the eaves of houses. There aren't even any white lines painted down the middle of the roads.

While busy maintaining its existing holdings, the Trust is always ready to rescue, as a kind of architectural fire brigade, any historic property threatened with destruction. When the poet William Wordsworth's house at Cockermouth in the Lake District was about to be torn down to make way for a bus station, local people clubbed together to buy it and present it to the Trust. And Washington Old Hall (p. 75), a comfortable manor house near Newcastle, where the ancestors of George Washington lived from 1183 to 1613, has been restored from a slum tenement occupied by six families.

"The place was almost a ruin," the Trust's local historical adviser, an energetic woman named Sheila Pettit, told me; "there was no furniture here at all. We even had to buy a 16th-century staircase from an old pub that was being pulled down."

Many Americans have contributed to the Trust's

The Trust screens its campgrounds with trees and discourages orange tents—with limited success.

restoration program at Washington Old Hall. Miss Mabel Choate presented an oak-paneled room in memory of Joseph Hedges Choate, a former Ambassador to the Court of St. James's. Charles Sumner Bird paid for the caretaker's lodge to be renovated, while a Houston, Texas, oil millionaire, Harris Masterson, has contributed a stump-work cabinet and other gifts. The task is not yet finished, and the Trust is trying to raise $250,000 to provide a long-term endowment for the Hall's upkeep. But the 8,000 visitors (many of them American) who call each year already see it restored to something of its former simple elegance. A wasteland of weeds around it has been transformed into green lawns and rose beds; the Stars and Stripes flies overhead on Independence Day, November 23 and, of course, Washington's birthday (the real one, not our present movable feast).

Preserving the houses of the famous is something of a Trust specialty. The former homes of Rudyard Kipling, George Bernard Shaw, Ellen Terry, Henry James and Sir Winston Churchill are all looked after.

At Chartwell, Sir Winston Churchill's country estate just south of London, the house is kept much as he left it. A table in the drawing room is still set out for his favorite game, bezique; large brandy glasses wait on a sideboard in the dining room; the library is filled with the books he collected over a lifetime; the desk in his study is covered with photographs of his family and closest friends.

Actually, Chartwell is something of an exception; most of the other houses of the famous are not turned into formal museums. Usually just one or two rooms are set aside with furniture, books and papers, while the rest of the house is lived in by a tenant who pays the Trust only a small rent in return for letting the public see the rooms on show at specified hours several days a week. Most people find it an agreeable arrangement for the privilege of living in a famous house. "It would be terribly expensive if we lived here without the Trust sharing the upkeep," said Peggy Smith, who lives in William Wordsworth's modest town house at Cockermouth, originally built for the Sheriff of Cumberland in 1745. "But you have to be prepared to enjoy life with people trekking through your home constantly. We had 14,000 visitors here last year."

The Trust also leases out some of its great houses for special educational purposes. Cliveden, the 19th-century mansion in Buckinghamshire that was the home of the Astor family (and center of a pre-World War II group favoring appeasement of the Nazis), has

been let to Stanford University as an English campus. Eighty Stanford students at a time visit there for six months for general studies, including English literature, modern history, architecture and political science. And Attingham Park in Shropshire provides the setting for an annual summer school at which some 30 experts, usually from American museums and colleges, come to study the development of the English country house. The participants get the feel of living in the great 18th-century mansion, and make day trips to 50 other historic houses owned by the Trust.

Such projects go far beyond the original dreams on which the Trust was created back in 1895. Its three founders—a social reformer named Octavia Hill; a lawyer, Sir Robert Hunter; and a Lake District parson, Canon Hardwicke Rawnsley—thought only, with a typical Victorian sense of charity, of buying up areas of natural beauty as "open air sitting rooms for the poor." (They took their constitution, incidentally, from the Trustees of the Reservations of Massachusetts, a New England conservation society founded in 1891). Their first acquisition (a gift) was a modest four and a half acres of cliffland overlooking the Barmouth Estuary in North Wales. An early purchase was a fine stand of beech trees on the shores of Derwentwater (pp. 72-73) that Canon Rawnsley was determined to see preserved.

Canon Rawnsley, together with Beatrix Potter, really consolidated the Trust's hold on the Lake District, perhaps England's finest area of natural beauty. Today its estates there run to 79,000 acres, embracing the shores of lakes like Windermere, Buttermere and Tarn Hows (opposite), and 68 farms with 17,000 sheep on the surrounding hills.

The Trust keeps the farms well maintained. Despite the fact that this kind of hill farming is no longer really economic, they regard the farms as an essential part of the rural scene they are dedicated to preserving. Undoubtedly, without their guiding hand many of the farms would fall into disrepair and even cease to exist. As it is, the Trust lobbies the government to provide the farmers with subsidies for the mutton and wool which keeps them going.

At the same time, the Trust strives to keep the area a semiwilderness. Unsightly power cables are put underground so that the grandeur of mountain passes is not ruined. Disused quarrymen's huts and tumbledown barns have been restored as "adventure huts" for climbers. Parking lots have been hidden away where possible, as in the bowels of ancient quarries. Trailer and camp sites have been strategically screened by trees, and free places are available for campers who have green or brown tents that blend with the scenery. The Trust has also tried to persuade makers to produce only such "environmentally acceptable" tents—without much success. "Too many campers prefer bright orange tents," lamented a Trust man sadly. "They like to feel they can be spotted by rescue helicopters if they get lost."

But local residents in the Lake District loyally pitch in to help the Trust conserve the landscape. At one restaurant near Buttermere the owner and staff all decline tips, explaining politely that if customers are satisfied, they should put contributions in a tin by the door labeled "Wall Fund." The money in the tin is given to the Trust to help rebuild the old stone walls that surround the nearby woods and scattered sheep fields. Last year the Wall Fund netted $1,200.

The Trust's long-standing care for countryside has been extended in recent years to concern for coastline.

A rare 17th-century bridge, made of uncleaved slate, spans a stream at Little Langdale.

A decade ago they embarked on an ambitious project called Enterprise Neptune, designed to acquire *all* the remaining coastline in England, Wales and Northern Ireland that was of outstanding beauty and worth permanent preservation. A survey revealed that of the 3,000 miles of coastline, one-third was already ruined beyond redemption and another one-third was of little recreational or scenic interest, but that the final one-third—some 900 miles—should be saved. Since it already owned about 175 miles of the 900, the Trust set out to obtain the rest. No one expected this to be achieved overnight. "We plan not months, but decades ahead," Bishop emphasized.

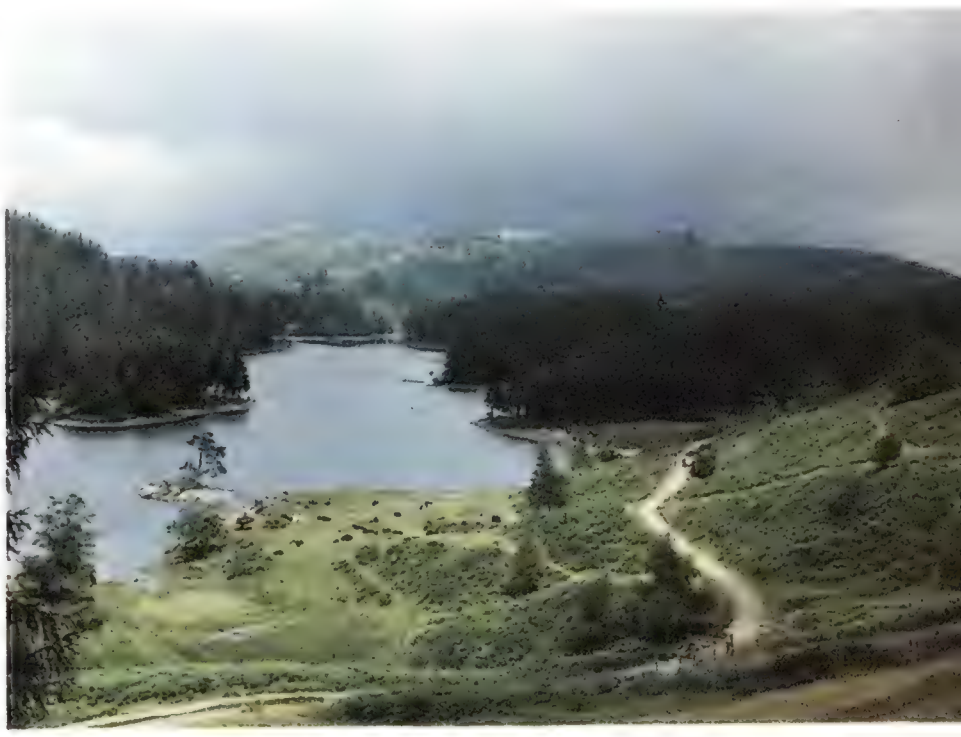
Ten years later, Enterprise Neptune has already raised more than $5 million, enabling the Trust to increase its stake to more than 350 of those precious 900 miles. Some landowners have given coastline. Playwright R. C. Sherriff *(Journey's End)* contributed a long stretch of beach and cliff in Dorset on the shore of the English Channel. The most recent effort has been to buy a mile of the White Cliffs of Dover.

Thus encouraged, the Trust has recently set a new goal for "The Next Hundred Miles," which it hopes to reach well before 1980. "That will mean we hold a half of all the coastline worth saving," says Trust spokesman Rich.

The rising public conscience about dangers to the environment has undoubtedly helped not only Neptune, but all Trust activities in recent years. "We've seen our membership double since 1971," reports Director-General Bishop, "and from being a small club we are now rapidly growing into something of a mass movement."

Climbers on a nature trail must study maps, since the Trust does not mark its trails with signs.

The Trust maintains three-and-a-half miles of Hadrian's Wall, begun by Romans in A.D. 122.



"The most photographed view in England": Tarn Hows, a small body of water in the Lake District.

But its popularity breeds problems. "Our biggest headache today," as Bishop pointed out, "is how to reconcile our primary purpose of preservation with the pressures now being created by overvisiting. The danger is that great numbers of people will spoil the very thing they come to see."

At Sir Winston Churchill's former home at Chartwell, for instance, so many visitors flooded in when the Trust first opened it after the great man's death that the lawns were ruined in three weeks. And at Sissinghurst Castle, Nigel Nicolson voiced similar fears. "In the year my mother died we had just 8,500 visitors," he told me. "This year it will be about 96,000. That's a terrible load of feet on six acres of garden. There is a real danger of destroying the serenity and peace of the private garden she created."

The Trust's strategy in the years ahead will be to try to encourage visitors to widen their own horizons by venturing to the less obvious, but often equally fine, places it owns. While some "honeypots," as the Trust calls them, struggle to cope with nearly 200,000 people a year, there are others that entertain no more than a few thousand.

The newest venture, however, is for the Trust to broaden its own horizons by strengthening its Anglo-American connections. On April 30, in New York, the Earl of Antrim, chairman of the National Trust, will announce the formation of the Royal Oak Foundation. This will be an American public charity with tax-exempt status, its purpose being to support and foster certain National Trust projects that are of interest on both sides of the Atlantic. The perquisites of membership ($15 a person, $7.50 for each additional member of a family) will include membership in the National Trust itself, admission to Trust properties, free literature and the possibility of "involving oneself personally in preservation on an Anglo-American scale," says executive officer Arete Swartz. Secretary Ripley of the Smithsonian Institution will be a trustee.

The Trust, of course, hopes to benefit substantially from increased aid for properties with American associations, such as Washington Old Hall. But more is involved than that. "We want to create scholarships for six or eight young Americans to come over each year to live in an English country house for a few weeks," explains Lawrence Rich, the Trust's man who is responsible for Royal Oak. "That way they can get the feeling of history associated with these great houses and learn something of the management of their estates."

American students will also be encouraged to come and work in the Acorn camps that the Trust runs each summer on many of its properties. Here unpaid volunteers clear nature trails, dredge ponds and shoulder a host of other chores. "We'd like groups of 30 or 40 students, with teachers, to come and get stuck into solid conservation projects," Mr. Rich told me.

But such broadening of Anglo-American ties will hardly alter the National Trust's very British character. While its domain today has spread far beyond those "open air sitting rooms for the poor" envisaged by its Victorian founders, it remains fiercely concerned to maintain their standards as the major inheritor of Britain's natural and architectural treasures.

The spectacular ruin of Dunstanburgh Castle, begun in 1316, dominates the Northumberland coastline.

Nigel Nicolson at Sissinghurst Castle, given to the Trust in lieu of death duties and famous for the superb gardens created by his parents, Victoria Sackville-West and Sir Harold Nicolson.

Dancing to Restore an Eclipsed Moon—Qágyuhl. The Qágyuhl believed the stench from a smoldering fire of old clothes and hair would rise up and force a monster in the sky to disgorge the moon.

By Caspar Weinberger jr.

Classic images of dying nations enjoy a rebirth

The monumental lifework of Edward S. Curtis was to portray the North American Indians as they had been before the white man arrived

In Hollywood in the early 1950s, it was a time of superstars. Few visitors to the movie sets took much notice of an octogenarian, Edward S. Curtis, who would be seen every now and then shooting still photographs. No De Mille, Curtis was hardly known to the general public. Yet, starting before the turn of the century and continuing for some 30 years, Curtis had made more than 40,000 photographs of the American Indian and published them in a multivolume work regarded as one of the finest pieces of visual anthropology ever.

"These pictures," Curtis wrote, "were to be transcriptions for future generations that they might behold the Indian as nearly lifelike as possible as he moved about before he ever saw a paleface or knew there was anything human or in nature other than what he himself had seen."

There is a spiritual and esthetic impact experienced in viewing Curtis' work. His was a romantic vision of the Indian, a romantic vision that matched the Indian's view of himself. To look through Curtis' complete opus, the 20 volumes of *The North American Indian* plus the 20 portfolios containing 722 photographs, is to be struck with awe and ultimately a sense of grief, an insight into knowing suffering. For these photographs were, after all, taken after the Indians *had* seen palefaces. Chief Joseph of the Nez

Previously a radio and television producer, Caspar Weinberger jr. is now a media consultant.

Percé (see photograph opposite) had been defeated and exiled in 1877. "I am tired of fighting," he had said then. "My people, some of them, have run away to the hills, and have no blankets, no food; no one knows where they are—perhaps freezing to death. I want to have time to look for my children and see how many of them I can find. Maybe I shall find them among the dead. Hear me, my chiefs. I am tired; my heart is sick and sad. From where the sun now stands I will fight no more forever."

It was not long after Joseph's defeat that Curtis, a young farm boy in Wisconsin, began to develop an interest in photography. Later, living on Puget Sound, he began to learn the photographer's skills in his own primitive studio, and to visit local Indian tribes. In one of his periodic jaunts on the slopes of Mount Rainier, he wandered under an icy ledge and found to his amazement a lost, half-starved climbing party. When he got them back to camp, he found that the climbers included George Bird Grinnell, the editor of *Forest and Stream* magazine. They corresponded during the winter and, in the spring, when a large scientific expedition to Alaska was organized, Curtis went along. He made more than a thousand photographs in the North and began to be known in limited national circles. Grinnell later introduced him to the Blackfoot Indians—and his lifework began. Curtis did most of his work on reservation land, his visits always announced beforehand.

E. H. Harriman, the railroad tycoon who had led the Alaskan expedition, aided Curtis in mounting an exhibition in the nation's capital. And then Teddy Roosevelt's inauguration attracted a group of Indian chiefs. Curtis was asked by the Commissioner of Indian Affairs to photograph them on the White House lawn, and he arrived to find his friend, the Apache chief Geronimo. Together they met Roosevelt, who told

A Zuñi Governor, whose features the photographer saw as typical of the faces of the Pueblo Indians of the Southwest. Below is *Quilcene Boy,* a member of a band of Twana that lived in Washington state.

Princess Angeline was for many years a familiar figure in the streets of Seattle. *A Hopi Man,* below, captures the wariness of the Hopi and, Curtis wrote, "an expression of masked warmheartedness."

Mówakiu—Tsawatenok. From the Canadian northwest these people were an inland, river tribe, hunting and trapping in the mountains. Below is widely known *Chief Joseph—Nez Percé,* whose last battle was in 1877.

The Old Cheyenne, photographed on horseback, in full regalia for battles that had been lost long before.

A Feast Day at Acoma. The pueblo dwellers gather on the rooftops, waiting for a tribal ceremony to begin.

Curtis, "I wish I knew as much about Indians as you do." It was at Roosevelt's urging, in a later meeting, that Curtis journeyed to New York in 1906 to meet J.P. Morgan and seek the funding that would permit him to continue his project.

The appointment with Morgan was nearly a disaster. The banker did not get up when Curtis entered the room and he rejected his plea for aid. But Curtis would not leave and, instead, thrust a portfolio under Morgan's eyes, open to a haunting picture of a Mojave maiden with the eyes of a wild animal. "This may be the third or fourth time in my life," Morgan said, "that I have changed my mind after once making it up." He agreed to support the work up to $75,000 and to pay the publishing costs. "I want to see these in a set of books, the handsomest ever published." The work then began in earnest; for the next 21 years, Curtis virtually disappeared into the Indian lands, crisscrossing the West from tribe to tribe. It is difficult to imagine the arduousness of so prodigious a venture. Travel was slow; equipment, such as his big, cumbersome reflex camera with its glass plates, was heavy and primitive compared to modern standards. His usual procedure was to start early, often at dawn, and work through the day, doing darkroom work and other chores long into the night. One of his assistants was a rapid shorthand writer and a quick typist, with an extraordinary ear for phonetics. The 20 volumes of *The North American Indian* are, in addition to their photographs, a compendium of facts of the sacred rites, musical forms, myths, games, architecture and vocabulary of the tribes.

A perfectionist as well as a missionary (a term he used to describe himself), Curtis knew precisely what he wanted each photograph to represent. In New Mexico he waited for days to make a single photograph of a man believed to be a sorcerer. He traveled hundreds of miles three times simply to get one picture in the correct light conditions. On several occasions he lost months worth of valuable plates when a boat would flip over or a mule lose its footing, throwing its cargo into a canyon. At these times, he would

Courtesy Jean-Antony du Lac/The Curtis Project

Edward S. Curtis (1868-1952). Teddy Roosevelt wrote that he had caught glimpses of lives "from whose innermost recesses all white men are forever barred."

simply and doggedly start over. Perseverance, however, was not always enough: Once, an Indian girl fell and killed herself when Curtis was on the reservation. He immediately packed up and left, knowing that the girl's death would be attributed to his presence. He was shot at four times.

The first two volumes of *The North American Indian* appeared in 1907 and 1908, and were immediately dubbed "the most gigantic undertaking in the making of books since the King James edition of the Bible." The other volumes followed over the next quarter of a decade. They were edited by Frederick Webb Hodge of the Bureau of Ethnology at the Smithsonian Institution, who modestly avoided comment on the artistic value of Curtis' photography, emphasizing instead, the volumes' scientific value: "a record that, less than a generation hence, must prove to be priceless to those who would know what had gone before."

The value of Curtis' ethnographic data aside, the force of his work for nonscientists rests in his photographs, but few people will ever see them all together in their entirety. J.P. Morgan had wanted a handsome set of books and the plans called for 500 copies of each set to be printed. The finest handmade papers were to be used—many plates were printed on Holland paper and mounted on a Japanese vellum, giving the photographs a certain three-dimensional character impossible to reproduce by other means. Of the 500 complete sets planned, only 300-odd were actually produced; the costs mounted to nearly $1.5 million. The first sets sold for $3,000 to $3,500, depending on the kind of binding desired. They became a gift for barons. The first subscribers included the king of England, the British Museum and Harvard's Peabody Museum, as well as Alexander Graham Bell.

Nowadays, if one could find a set intact and for sale, it would cost more than $35,000. Rare book libraries and museums have kept most of the extant sets intact. Until recently, one rarely saw the Curtis collection displayed because the interest of the owners is in protecting the work. The volumes usually stayed locked in a vault. A complete set is kept in the rare books section of the Smithsonian Anthropology Library.

As a result of this natural desire to protect so valuable and monumental a record, it is a very small minority today—mostly scholars—who are aware of the totality of Curtis' great endeavor. Nevertheless, like the title of one of Curtis' famous photographs, his art now appears to be coming "out of the darkness."

Books have begun to appear on Curtis (see Additional reading, p. 112) and recently 80 gravures were placed on exhibition at the Corcoran Gallery in Washington, D.C., framed in simple beauty along two long walls. The exhibition is now in Mill Valley, California, and will move to Sacramento in June and probably will go to other cities later.

We are beginning to recognize what Curtis saw long ago and wrote about with a certain warm melancholy: "The Indians could have given us that physical vigor which must be one of the last and important foundations of any lasting and important mental strength. They could have helped us in the creation of a literature, for they were marvelous in the beauty of their free, poetic thought, full of imagery. . . ."

Curtis wished to avoid all traces of white culture in his photographs but *A Hopi Mother* wears a safety pin.

Text and photographs by Andrew Skolnick

Hydra: versatile green predator

With tentacles and body contracted, the hydra looks like a tiny cactus. Color is from algae in its tissues.

This common freshwater polyp can easily be taken for a plant, but it acts like the mythological creature Hercules killed

We often borrow names from the gods, heroes and monsters of ancient Greece in classifying and naming all we survey. Arachne, a maiden who was turned into a spider for challenging and arousing the envy of Athena in a weaving contest, gave us the name Arachnida for the class of arthropods which includes spiders. And you need know only its name to wish to avoid a Hercules beetle. Many such names are fitting, but few are as appropriate as hydra, the name of a freshwater coelenterate, a relative of the oceans' corals, sea anemones and jellyfish.

One of the 12 tasks imposed on Hercules was to slay the Hydra of Lerna. It had nine serpentlike heads, one of which was immortal. So potent was its venom that even its smell was fatal to those who passed too close. Worst of all was that for every head Hercules cut off, two more grew in its place. He finally triumphed by cauterizing the wounds with a firebrand as he chopped away and by burying the immortal head under a rock.

Long after Hercules' labors, in 1702, the Dutch inventor of the microscope, Anton von Leeuwenhoek, discovered the tiny freshwater polyp in his searches. In 1740, Abraham Trembley, a Swiss naturalist, first discovered the green species of this creature and described it scientifically. For a long time he couldn't decide whether it was a plant or an animal. It was as green as a plant, yet it could move like an animal. To settle the question, he cut the polyp in half. It was known at the time that lizards could regenerate a tail and crayfish a claw, yet Trembley believed only a plant could regrow as much as half of itself. Tilting toward the animal theory, he was amazed to find the head half with a new bottom and the bottom half with a new and complete head. Continuing his regeneration experiments, he cut the polyp's head lengthwise in two and the polyp grew two intact heads. He repeated these cuts until he had a seven-headed polyp and naturally enough he compared his multiheaded creation to the mythological monster. In 1758, Linnaeus, finding Trembley's comparison fitting, gave the name *Hydra* to this genus of freshwater polyp.

Hydras are commonly found hanging inconspicuously from vegetation or from the water's surface film in most streams, lakes and ponds. From 3 to 50 millimeters in length, they search the water with their four to eight long, thin tentacles for crustaceans, insect larvae, worms or any other animal small enough to be overcome and engulfed.

Some hydras are red, some are brown, but perhaps the most interesting is the green species, *Chlorohydra viridissima,* shown on these pages. This hydra owes its color to algae (called zoochlorellae) that live within its inner cell layer in a relationship called symbiosis, which means, in effect, that both sides gain. The algae gain by having a place to live and reproduce. And thanks to the nutrition the hydra derives from the algae, it has remarkable regenerative powers, even

Andrew Skolnick is a young Connecticut free-lancer whose work has appeared in Natural History.

Fully extended, its tentacles sweeping the water for its prey, the hydra reaches heights of up to two inches.

when little or no other food source is to be found.

Mistaking a hydra for a plant, as Trembley did, is easy; at first glance they are as immobile as any tiny pond plant. After a few moments the hydra spontaneously contracts into a tiny spot, a mere fraction of what it was, and then slowly extends in a different direction. Patience will allow you to see all of the varied forms of locomotion the hydra uses to get about. It may "walk" with almost imperceptible slowness along the substratum, clinging by its base with a sticky mucous. It may parachute to the bottom with outstretched tentacles, there to feed on organic debris. It may rise again like a hot air balloon by generating a gas bubble at its base. It can hang by its base from the depression of the water surface and walk or flow with the current. It can bend its tentacles and inch along by alternately attaching tentacles and base to the substratum. By moving its base entirely over, it can progress by somersaulting along.

Like other coelenterates, hydras are composed of two thin cell layers separated by a gelatinous substance called mesoglea. Like a rubber glove sealed at the bottom, the hydra encloses a digestive cavity extending from its base to the tips of its tentacles.

The whole organism is composed of just six basic kinds of cells. Nerve cells are laid out in a simple two-dimensional network, primitive compared to the three-dimensional system of Man and the earthworm. The digestive and gland cells are located in the inner cavity where food is broken down into minute particles. The particles are then absorbed into the individual cells where the digestion of protein into amino acids takes place. There are the connective, supportive and locomotive tissues, and there are sex cells, but the latter are created only when the hydra goes sexual under conditions not well understood.

Normally, hydras reproduce by budding. The buds begin as a pair of bumps 180 degrees apart on the growth region of the body column. They elongate, grow a mouth and tentacles, pinch themselves off, and inch-worm or somersault away. Well-fed specimens often have a second or even third pair of buds above or below and at a 90-degree angle to the first pair.

In a manner of speaking, the hydra is as immortal and unaging as was its mythological namesake. Old cells migrate up the body and slough off at the ends of the tentacles, being replaced by new cells; the entire hydra is replaced by new cells every 45 days or so.

The source of most of these new cells is what are called interstitial cells. These cells can differentiate

Tentacles curled, a hydra is ingesting its prey. "Mouth" is at right; its whole body is the stomach.

With an air of surfeit, hydra is at rest, digesting its meal. It can also survive on algae in its cells.

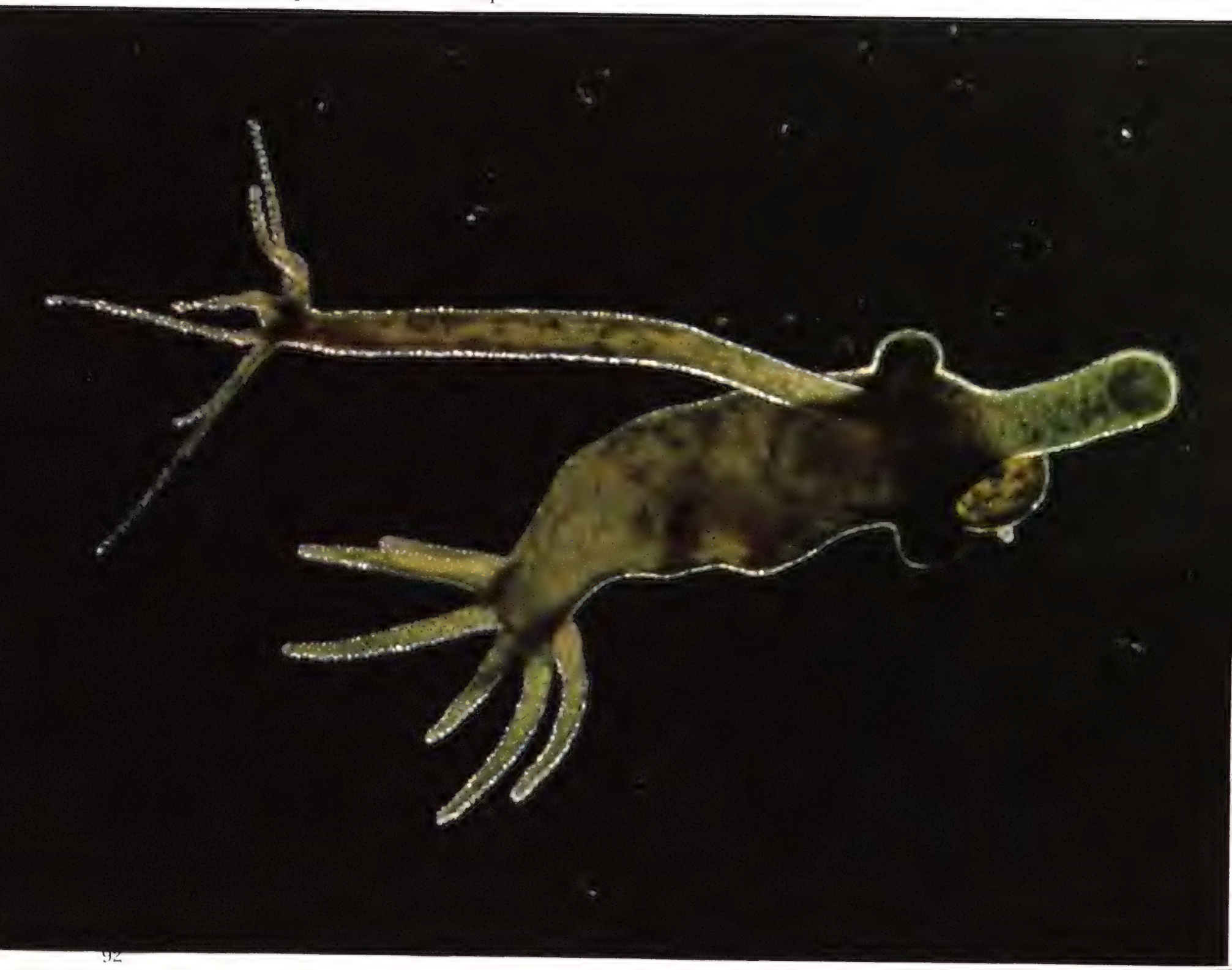
With its tentacles, a hydra bud snares its prey, Cyclops, a tiny one-eyed crustacean also named after an ancient Greek monster. The bell-shaped protrusion on hydra's body (upper left) is the bud of another hydra.

into almost any other kind of cell that the hydra requires for its normal life functions; they are the sole source for nerve cells and glandular cells, for example. They are also the sole source of sex cells.

When autumn arrives, bringing conditions that threaten the survival of the hydra, it ceases to replace itself and goes sexual. For the hydra, the price of sex is generally death. The interstitial cells stop producing other kinds of cells and engage exclusively in producing eggs and sperm. (Some hydras are hermaphroditic.) The fertilized ova develop into embryos with hard coatings that protect them when they separate from the parent and lie dormant in the mud. The next generation emerges in spring, thus achieving for the species a kind of immortality more familiar to Man.

The mythical Hydra was deadly poisonous, and the zoological counterpart echoes its namesake in this regard as well. Along the tentacles are deadly batteries

A mature bud has extended itself (left) into a long stalk and is about to pinch itself off and depart.



of cells called nematocysts, the most complex cellular organs in the animal kingdom. The hydra has four types. The largest contains a harpoonlike stylet with spines. When fired, the barb penetrates the prey and anchors it to the tentacle by a thread while injecting a virulent poison. Judging from its incredible potency and speed of paralysis and death, the poison is believed to be a nerve toxin protein. A second kind of nematocyst is smaller and contains a thicker and shorter corkscrew thread. When discharged, this type holds fast to the tiny hairs and bristles of the prey. A third type, which has a sticky bean-shaped object at the end of a smooth thread, serves during tentacle-assisted locomotion. Finally, a fourth kind differs in having spines along the thread and is believed to be used in defense against paramecia and other enemies.

Once the hydra's prey has been "harpooned," substances released from the prey's wounds initiate the feeding response. The portion of tentacle between the embedded nematocyst and the hydra's head contracts, bringing it to the mouth while the free tentacles make sweeping movements toward the mouth. The opening mouth then creeps over it with little or no help from the tentacles, much like a sock putting itself on a foot. With prey almost as large as itself, the hydra stretches so thin in getting its digestive gut around it that the prey animal appears to be covered with a thin transparent film; only the tentacles tell you that you are looking at a hydra.

Except for its size, this wetland creature with its many serpentine "heads," armed with harpoons and virulent poison, protected by incredible regenerative powers, and with its own kind of immortality, is very much like the fiend that Hercules killed. Indeed, imagining a creature to symbolize their fears of the dangers of the marshlands, the Greeks did well.

One hydra bud somersaults away from its parent as another grows. Hydras often have four buds at a time.

By Michael Jacobson

Our diets have changed, but not for the best

We eat more sugar, salt and fat, but less fiber, than our grandparents; a lot of us end up paying a penalty

If the bromide, "You are what you eat," is true, we could all end up being very different people from our ancestors. Modern science and agriculture have freed the United States and many other nations from traditional diets based largely on natural farm products. New varieties of crops, transcontinental shipping, a wide spectrum of food additives, and new food-processing techniques have led, for better or worse, to diets different from any previously consumed by human populations. But these dietary changes reflect the decisions of business executives and investors, rather than nutritionists and public health officials.

The United States, not surprisingly, has been the leader in the genetic engineering of food crops and in the laboratory creation of new foods. Benjamin Franklin and Abraham Lincoln, if they could visit us, would probably have some difficulty distinguishing between a toy store and a supermarket. They would not even recognize as foods such products as artificial whipped cream in its pressurized can, or some of the breakfast "cereals" that are almost half sugar and bear little resemblance to cereal grains. Franklin and Lincoln would probably feel much more at home in the homey "natural foods" stores that are popping up everywhere than they would in the 10,000-item supermarkets. Many of the new foods do save us time and trouble, but they are often costly, in terms of both dollars and, ultimately, health.

"Modern" eating practices start young, often with the tiny infant. Most pediatricians agree that good old-fashioned breast-feeding is the best way to feed a baby, but all too often mothers are persuaded by cultural and commercial pressures—or because of their work schedule—to bottle-feed with canned baby formula. Only about one in four infants enjoys the nutritional (and psychological) benefits of breast-feeding.

Until the 1930s solid baby food was prepared at home by the mother. Now, however, commercially prepared strained baby foods are the rule and are being introduced into a baby's diet at an increasingly early age. Mothers often compete with one another on the basis of how early little Johnny or Susie starts to eat solid food. Many researchers believe that feeding a baby solid foods too early can lead to both over-feeding and allergic reactions.

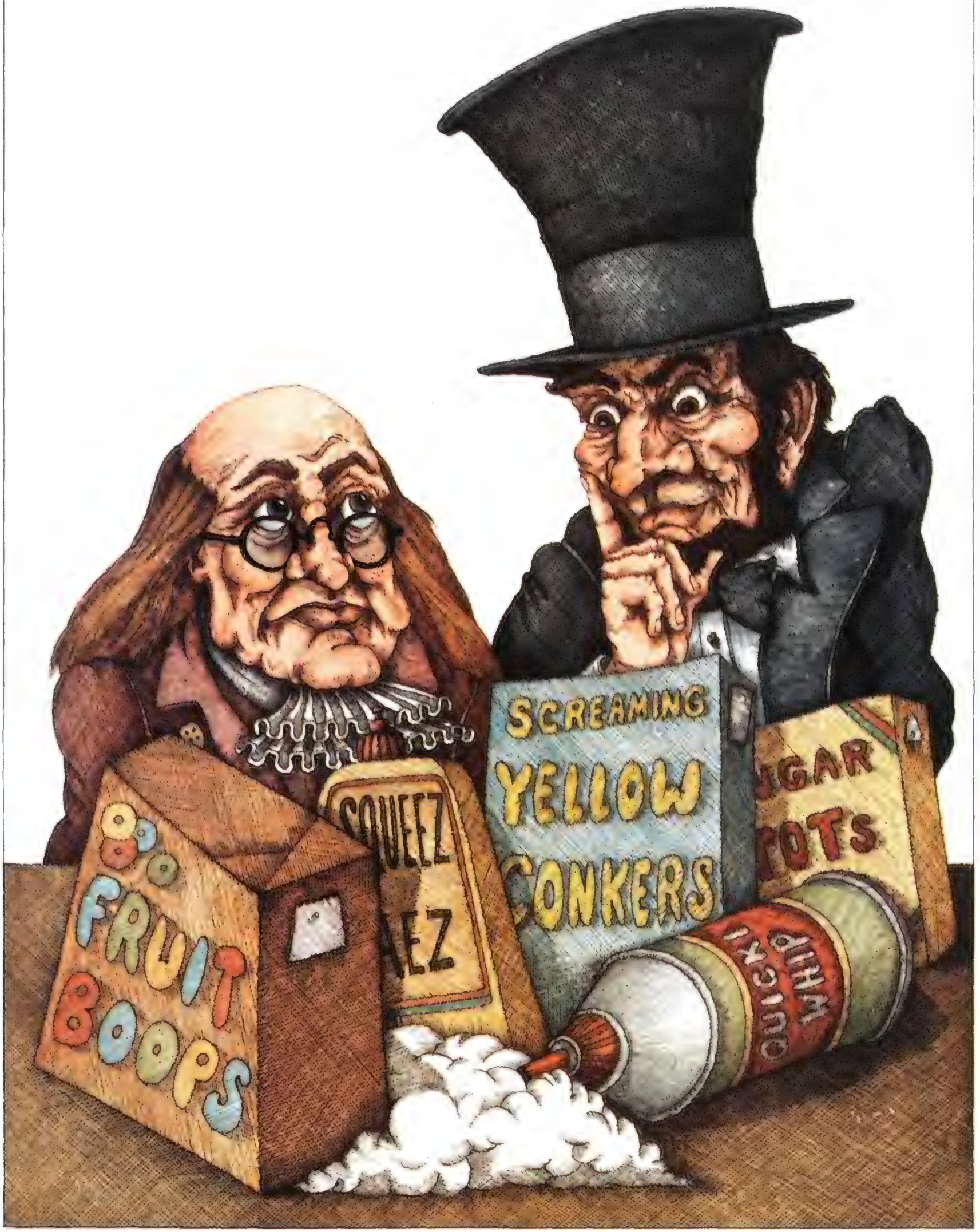
Some pediatricians and researchers worry about the health consequences of commercial baby foods. In the past 20 years canned formula has become the most popular food for infants. Although this is probably superior to the old-fashioned formulas based on evaporated milk and corn syrup, it is still a pale imitation of human breast milk. For instance, it lacks the antibodies and enzymes that help ward off disease and the "bifidus factor" that promotes the growth of favorable intestinal bacteria. Because it is based on cow's milk, infants may have allergic reactions. Differences include higher levels of sodium and unsaturated fats and lower levels of cholesterol as compared to breast milk.

A researcher at the University of Iowa, Dr. Samuel J. Fomon, suggests that formula feeding may be more likely than breast-feeding to lead to obesity in later life. He reasons that the formula-fed infant is expected to finish the last drop in the bottle, while the breast-fed baby stops when he has had enough. Fomon and his colleague, Dr. Thomas A. Anderson (who once worked for Heinz, a major baby food manufacturer), have also suggested that early introduction of solid foods may lead to overfeeding—the infant often is expected to finish the last spoonful in the dish.

Pediatricians also wonder about strained baby foods. Although as yet they have little solid evidence, some fear that the salt and sugar used so freely as flavorings establish taste patterns that remain with a person throughout life.

In 1969 a Congressional committee held hearings that focused on the high salt content of baby food. This attention led the manufacturers to reduce voluntarily the salt levels in baby foods, but many products still contain up to ten times as much sodium (mainly from added salt) as does breast milk. Salt is of great concern to doctors and nutritionists because too much of it in the diet of adults contributes to high blood

Dr. Jacobson, a biochemist, is a director of the Center for Science in the Public Interest.



Franklin and Lincoln might have a little trouble identifying some of the foods displayed in a modern supermarket. New crop varieties, additives and processing techniques have led to new diets.

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A taste for salt and sugar acquired in infancy can hurt one later.

pressure (hypertension), which is the primary cause of about 20,000 deaths a year and is the major underlying factor in some 900,000 deaths a year from stroke and cardiovascular disease. Dr. Jean Mayer, Professor of Nutrition at Harvard University and probably the most influential nutritionist in the country, has said that "preventing hypertension would be much better than finding it and treating it—and a critical step in prevention is so easy: Just eat less salt."

For a child whose taste buds were initiated on blueberry buckle, raspberry cobbler and other sweetened and salted baby foods, the step to artificially colored and flavored sugar-coated breakfast "cereals" is a small and natural one. Many of these products, which could be called candies, are 30 to 50 percent sugar. One widely known children's cereal, for instance, contains a higher percentage of sugar (approximately 50 percent) than a chocolate bar (40 percent).

Highly sweetened foods encourage young children to develop a taste for sugar, of which the average American consumes approximately 100 pounds per year. Dental researchers have proved that sugar is a major cause of tooth decay. In addition, sugar's "empty calories" displace nutritious foods and contribute to obesity, diabetes and heart disease.

While the Food and Drug Administration has not taken any action on the high sugar content of some cereals, Dr. Lloyd Tepper, Associate Commissioner for Science at FDA, said this at a 1973 Senate hearing on nutrition:

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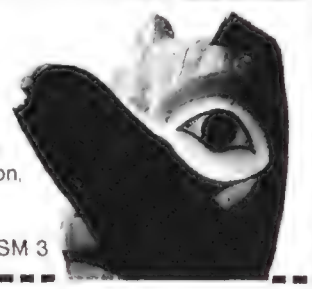

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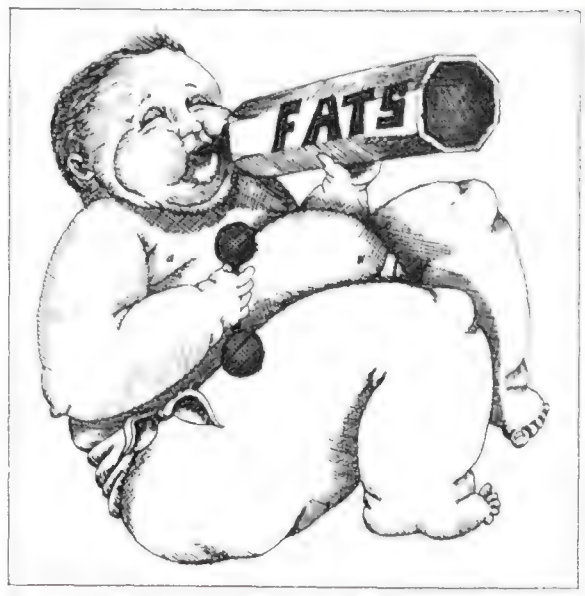

A fat baby may become a fat adult, which is not to its advantage.

highly sweetened, sucrose-containing material, which is naturally tacky when it gets wet, is going to be a troublemaker. And I would not prescribe this particular food component for my own children, not on the basis of scientific studies, but because I do not believe that prolonged exposure of tooth surfaces to a sucrose-containing material is beneficial."

While tooth decay is certainly not a deadly disease, it can be both painful and costly. Army surveys indicate that, on the average, every 100 inductees require 600 fillings, 112 extractions, 40 bridges, 21 crowns, 18 partial dentures and one full denture. Although Americans currently pay dentists about $2 billion a year for treating decayed teeth, Dr. Abraham E. Nizel, of the Tufts University School of Dental Medicine, has estimated that we would be paying $8 billion a year if everyone went to the dentist and had all his dental needs taken care of. It is Dr. Nizel's impression that tooth decay is so rampant that even "if all the 100,000 dentists in the United States restored decayed teeth day and night, 365 days a year, as many new cavities would have formed at the end of the year as were just restored during the previous year."

As children grow older and more independent, most of the messages they get from the adult world encourage them to eat food that is not best for their health. School cafeterias frequently serve meals rich in fat and low in whole grains. Television commercials employ the latest ad agency techniques to promote sugar-coated cereals and snack foods. The U.S. Department of Agriculture—over the objection of many nutritionists—allows

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schools to serve children nutrient-fortified cupcakes for breakfast in place of cereal and orange juice. Vending machines invite children (and adults) to buy soda pop, candy and gum. Fast-food outlets specialize in meals that are almost devoid of vitamins A and C, two of the vitamins that many Americans consume too little of. Living in this kind of environment, children may be confused when their health teacher admonishes them to "eat good foods."

America's eating habits are epitomized by what is served at our standard celebrations: baseball games, carnivals and picnics. What child would be caught at one of those affairs without a hot dog and soda pop? The child does not realize (and is not told), of course, that a diet with too high a fat content (including, for example, too many hot dogs) can contribute to the epidemic of heart disease and obesity with which this country is saddled.

Obesity is a serious medical problem. Dr. Ogden Johnson, former Director of Nutrition at FDA, has estimated that 40 million Americans are overweight or obese. In addition to being a severe social and psychological handicap, obesity is a major factor in cardiovascular diseases, mentioned earlier.

Vending machines invite us to buy foods that displace more nutritious ones.

The fluffy white bun in which the hot dog is served is made from white flour, which lacks some of the nutrients that are present in whole wheat flour. Fiber is one substance that is almost entirely eliminated when the flour is refined. For several decades most researchers ignored this indigestible carbohydrate, disdaining it as mere "roughage." But evidence is mounting rapidly that fiber plays a crucial role in maintaining the health of the gastrointestinal tract (particularly the large intestine), in controlling calorie intake and in excreting cholesterol.

British physicians, notably Drs. Denis Burkitt, Thomas Cleave, G. D. Campbell and Hubert Trowell, have led the campaign to awaken the medical world to the importance of fiber. On the basis of field experience and laboratory studies, they maintain that people who consume too little fiber—and too much sugar—stand a high risk of developing obesity, diverticulosis, appendicitis, hemorrhoids, constipation, peptic ulcer, diabetes, heart disease and cancer of the colon.

Although Americans do get a substantial amount of fiber from fruits and vegetables, Burkitt and Trowell believe that this fiber is not nearly as effective in maintaining health as that found in whole grains and legumes. Many physicians and nutritionists in the United States are now urging Americans to base a larger part of their diet on whole grains, nuts, bran and other fiber-rich foods.

In their middle years, most Americans consume a diet that is reasonably complete as far as vitamins, minerals and pro-

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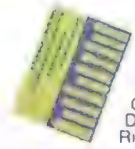

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tein are concerned. The typical diet usually reflects eating habits formed in childhood, however, and is hazardously high in calories, sugar, fat, cholesterol and salt, and hazardously low in fiber. Still, aside from dental problems and obesity, this diet usually causes no overt problems during the middle 20 or 30 years of most people's lives. Scurvy, pellagra, beri-beri and other nutritional-deficiency diseases are almost unknown in the United States. After about age 40 or 50, however, the changes within the body that have been gradually and silently occurring over the decades begin to make themselves felt.

A heart attack or stroke is often the first sign that something is wrong. After the fact, physicians often urge dietary (and other) changes to prevent recurrences. The patient is ordered to lose weight and eat less cholesterol and less fat—especially the saturated fat found in meat and dairy products. The person who is around to make these changes in eating habits should consider himself lucky. The American Heart Association recommends reducing fat consumption and body weight *before* a heart attack drives home the message.

Americans who have lost their teeth sometimes return to baby foods.

As old age approaches, signs frequently show up first—and painfully—in the large intestine. Every television watcher who suffers through the incessant commercials for laxatives surely knows that constipation or, euphemistically, "irregularity" affects millions of people. The commercials push brand-name panaceas, but vegetables, whole grain breads and cereals, and fiber-rich bran (which you can get in bulk from health food stores or as one of the all-bran cereals) can do the trick equally well. Of course, eating an adequate amount of fiber-containing foods all along would have helped prevent constipation from developing.

Many elderly Americans suffer from diverticulosis of the colon, and every year approximately 170,000 people are hospitalized for treatment. This often painful illness develops when pressure builds up within the large intestine, causing outpouchings, which frequently become infected. The prescription for prevention or treatment is the same: a diet high in fiber-rich foods.

To complete our description of a lifetime of eating, we return to baby food. This time around, though, the consumers are not infants, but the elderly who have lost their teeth as a result of decay and gum disease and can eat only semi-solid strained foods. About 18 percent of all American adults have no teeth.

Ironically, some of the same companies that manufacture the foods that contribute to heart disease, constipation, and other illnesses of middle and old age have special lines catering to the sufferers of these illnesses. Individuals who have become constipated partly through eat-

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Deep in the Guatemalan jungle lies the ancient city of Tikal, whose very existence baffles archaeologists. Why the Mayans picked that remote location to build a city, how they built it, and why they abandoned it during its height of splendor, are just a few of the questions surrounding this unique place. It's only within the last 30 years that access through the jungle has enabled scientific exploration of 2500-year old Tikal. And it remains one of the most beautiful untouched wonders of the world.

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ing sugar-coated flakes can switch to all-bran. Did high blood pressure result partly from heavily salted soups? The hypertensive patient can turn to dietetic low-salt soups (and pay a little extra for *not* having salt). Diabetics who once loved fruit canned in heavy sugar syrup must pay a premium price for fruit packed in water.

Despite the close relationship between diet and disease, no person, governmental agency or private organization in the United States has had the mission or authority to develop a broad national food policy that would consider nutritional value as a top priority in the way our food is grown, processed and distributed. As it is, our agricultural practices and eating habits have developed with little guidance from health professionals.

The importance of developing a coherent national food policy has gained much high-level support in the past year, largely because of rising food prices and an increasing awareness of nutrition. Famine overseas has also awakened many people to the moral obligations of the wealthy nations. The development of a food policy was given a boost last June, when the Senate Select Committee on Nutrition and Human Needs held a hearing on a national nutrition policy.

Heard time and time again at the Senate hearing was the need for us to base a larger part of our diet on vegetables than we now do. As Frances Moore Lappé explained so eloquently in *Diet for a Small Planet*, growing soybeans and grain to feed livestock and then eating the livestock is a much less efficient way of producing food than eating the vegetable crops (see SMITHSONIAN, January 1975). Huge amounts of fertilizer, energy and food would be saved if Americans ate less grain-fed meat. More food could go to nations in short supply.

Serving as one cornerstone of a food policy should be the vast amount of knowledge that the world's researchers have produced in recent decades. We need to *apply* the findings of this research. One way of facilitating this would be to establish a Federal Nutrition Advocacy Agency, which could disseminate information to the public and professionals, and prod other governmental agencies to employ their resources to encourage better nutrition.

While awaiting the creation of such an agency, we can easily improve our own diets. For most of us, that means eating less fat, sugar, refined flour and salt—and more fiber. In terms of foods, that translates into more whole grain foods, fruits, nuts, beans and vegetables, and less meat and snack foods. A change to this kind of diet would mean better health for Americans and more food for the rest of the world and would give us less cause to worry about becoming what we eat.

Most nutritionists feel we would be better off if we ate less meat and more grains, nuts, fruits and vegetables. A change would enable us to grow more for export.

Travel Benefits for Smithsonian Associates

With the growth of the Smithsonian Associates, the Institution is striving to meet the needs of its membership by offering a varied travel program. Traditionally, Foreign Study tours provided culturally oriented, first-class, specialized trips under the guidance of museum curators or experts in respective fields. Then, Domestic Study tours were added to offer similar opportunities within the United States, thus allowing Associates and their families a chance to combine vacation with a period of study. Last Fall, Foreign Charter tours were introduced; these trips are larger, lower-cost and more generalized in nature. This month we are pleased to announce a new category of travel sponsored by the Division of Performing Arts in cooperation with United Buying Service. These tours are also low-cost, but they are specifically tailored for Associates wanting to concentrate on the performing arts, with an emphasis on the London theater. Travel benefits are announced exclusively in SMITHSONIAN. For information on a specific tour, write addresses below.

Domestic Study Tours

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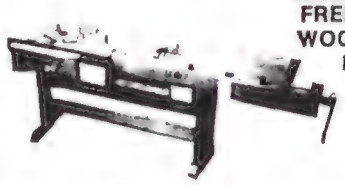

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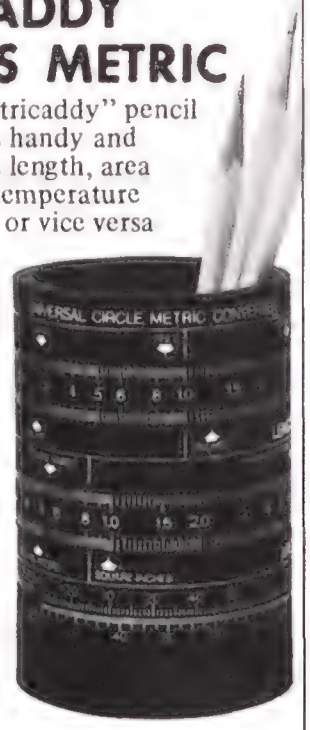

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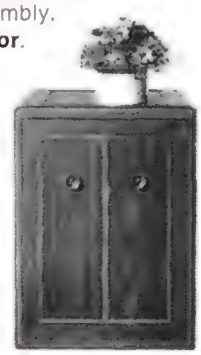

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Book reviews

The Galactic Club: Intelligent Life in Outer Space
Ronald N. Bracewell
(Scribner/Freeman, $6.95)

The New Mars: The Discoveries of Mariner 9
William K. Hartmann and Odell Raper
National Aeronautics and Space Administration
(U.S. Government Printing Office, $8.75)

In the autumn of 1960, astronomer Frank D. Drake and colleagues at the National Radio Astronomy Observatory turned a radio telescope skyward in an attempt to detect signals from extraterrestrial civilizations. That search was unsuccessful. But that it was conducted at all was evidence of the emergence of a new subject of scientific curiosity, exobiology, or life beyond Earth.

The possibility that life might exist elsewhere has intrigued Man for centuries, principally in fantasy and science fiction. But only in recent years, particularly in the last two decades, has a spate of discoveries in many scientific disciplines permitted the study of exobiology to proceed with any assurance.

Even so, it has been said that exobiology is the only major scientific interest which has no real subject matter, at least not yet. The field is obviously speculative. Most of its assumptions are educated guesses underpinned by observed phenomena, and braced, always tentatively, by mathematical probabilities. How many planets are there in the universe? How many capable of sustaining life? How many with life? Intelligent life? Civilization? If they are out there, how can we

find them? What will we say? These are just a few of the questions the exobiologist must try to answer as logically as he can.

These are some of the many matters which Stanford University professor R. N. Bracewell considers in *The Galactic Club*. Professor Bracewell is a designer and user of radio telescopes, and this professional concern is reflected in his interest in communication with extraterrestrial civilizations.

The Galactic Club is a personal book, cheerful, if properly cautious, and nontechnical. Quickly covering theories on the origins of solar systems and the origins of life, Bracewell moves on to his principal area of interest, the multifaceted problem of detection of and communication with extraterrestrial intelligent life. He is thorough, introducing various possibilities for each aspect of the problem.

Should we talk to an extraterrestrial civilization? Yes, says Bracewell. Information received from another civilization could prove to be of immeasurable benefit to our own. How should we communicate? In person? By probe? By radio? The latter is certainly the most practical at present. Interstellar distances are so great that technical difficulties and cost as of now seem an insurmountable barrier to communication in person or by probe.

What would we say, and how? Bracewell suggests several ways to talk to an extraterrestrial, who won't in all likelihood speak any earthly language.

Contact with another civilization would obviously be one of the most momentous events in human history. *The Galactic Club* is an excellent summary of the possibility and consequence of such a contact.

Meanwhile, humanity is companion to itself, corralled in the relative microcosm of the solar system by the vastness of interstellar space. What are we doing in the here-and-now with our little bit of space? We are exploring it, at a pace that would have bewildered an astronomer only decades ago. Six pairs of astronauts have landed on the moon. Five planets—Mercury, Venus, the Earth, Mars and Jupiter—have been examined by unmanned space probes and satellites.

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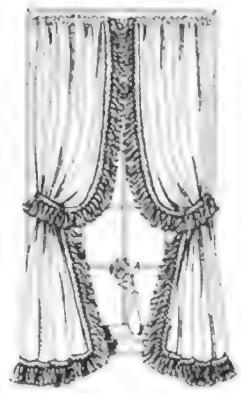

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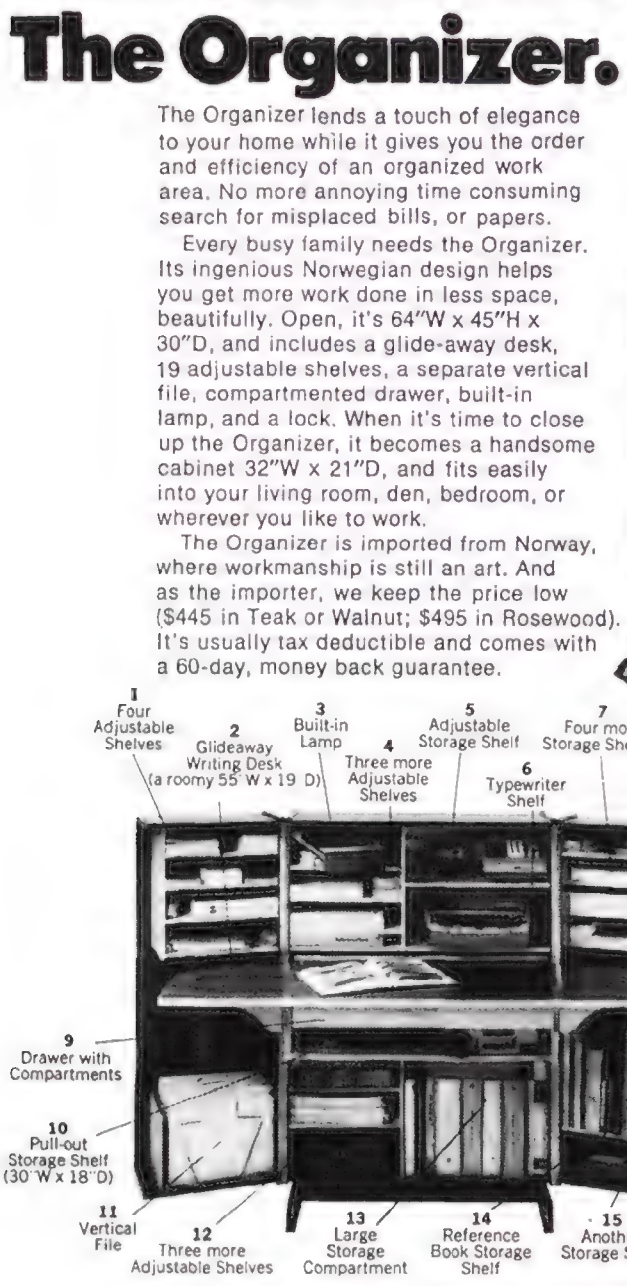
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manned space probe traveled 250 million miles and arrived within 31 miles of the target point, a feat, as the authors say "virtually indescribable by any earthly analogy." Once arrived in Mars' orbit, Mariner 9 transmitted to Earth more than 7,000 images of the surface, completely mapping the planet.

The Mars revealed by Mariner 9 is an extraordinary planet. A volcano, Olympus Mons, is more than 300 miles across, rising perhaps 15 miles above the surface and dwarfing all earthly volcanos. Vallis Marinens is a stupendous canyon, or rift in the surface, 2,500 miles long, four miles deep, as much as 125 miles across.

In other areas are great dune fields, and chaotic, jumbled terrain, and polar caps, and—most mysterious—great meandering features which resemble dry watercourses on Earth. But the atmospheric pressure is too low for water to exist as a liquid, at least at present. If water has existed, life on Mars may exist or may have once existed. Perhaps the two unmanned Viking spacecraft, scheduled to land on the planet in 1976, will provide an answer.

The New Mars is a fascinating book, well written and not too technical for most readers. It is recommended to anyone with even a passing interest in the solar system and beyond.

—Alexis Doster III
Assistant Curator, Astronautics
National Air and Space Museum

A Choice of Sundials
Winthrop W. Dolan
(The Stephen Greene Press, $10)

Sundials are almost bewitching. One built in India in 1724 flings its shadow by means of an 118-foot stairway. Another, designed in France in 1800, was mounted so that the sun's rays, precisely at noon, fired an ingenious miniature cannon loaded with gunpowder.

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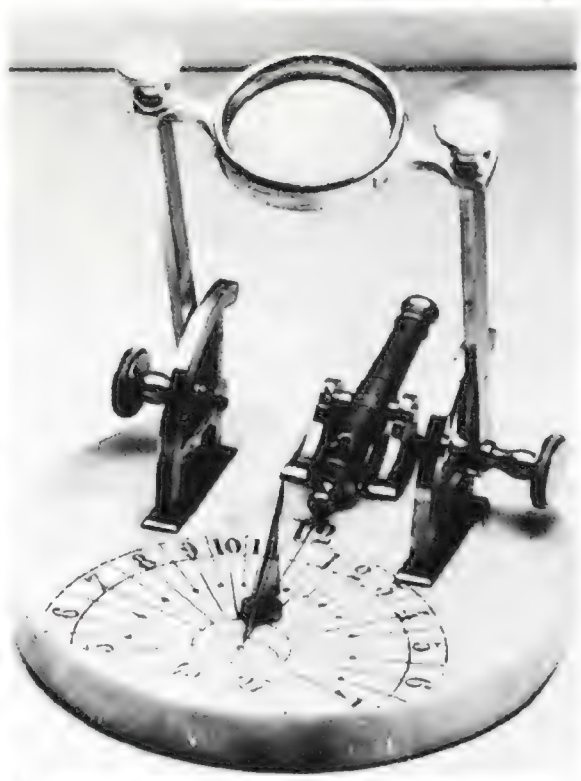

A cannon sundial fired with gunpowder

matics at Linfield College in Oregon, and past president of the Oregon Academy of Science, Winthrop W. Dolan lists as sources in his bibliography Herodotus, Plautus, Vitruvius, Cicero, and writers of the 15th century A.D. Sundials may have existed as long ago as Egypt of 3000 B.C., and an Egyptian "shadow clock," which kept time haphazardly, was used in 1400 B.C. But it wasn't until A.D. 1300, says Dolan, that "the great event in sundial history" occurred.

Someone introduced a polar-style instrument, which was a much more accurate timepiece.

The Chinese are known to have developed in the third century B.C. an intricate equatorial sundial which was divided into hundredth parts of a day—equal to about 14 minutes of our time. But, mysteriously, the Chinese sundial art then vanished until the 13th century A.D., when contacts with European and Arabian travelers became more frequent. Dolan is unsure who unveiled the new sundial to whom, but suggests that the Chinese may have been responsible.

The equatorial sundial can be built, in fact, by the reader if he follows the steps in the chapter, "Here's How To Do It." He also can design a polar plane dial, horizontal dial, south-, east-, west- and north-facing vertical dials, and declining, reclining and inclining dials. He is told how to calculate latitude angles, but if "trigonometry is not your dish of tea," charts are conveniently provided. Dolan has figured hours, half-hours, and lati-

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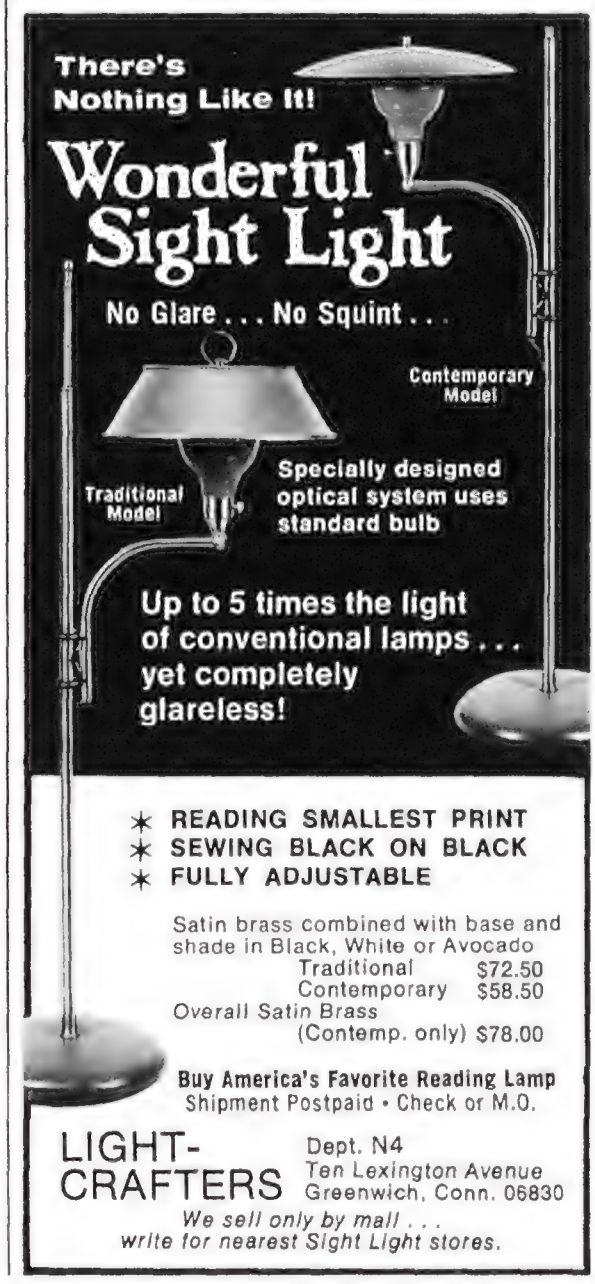
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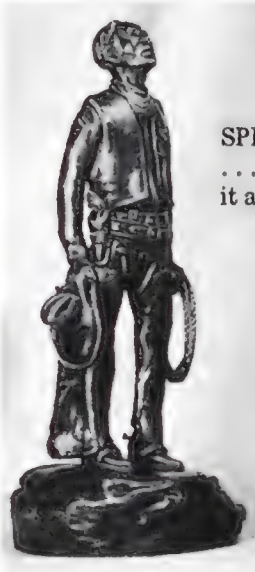

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tudes at half-degree intervals from 20 degrees to 70 degrees.

Sundials are not as numerous in America as elsewhere because colonists brought with them from Europe mainly clocks and watches. Nevertheless, Dolan has devoted a vivid chapter to photographs of American sundials. Chosen are the ones which "appeal to me in one way or the other," and the selection reflects the personal quality of the book.

—Henry Christner
Journalist and book reviewer

The Cavendish Laboratory 1874-1974
J. G. Crowther
(Science History Publications, $50; prepaid from publisher, $35)

Historians who specialize in science normally ally themselves with one of two philosophical camps, styled *internalist* or *externalist*. Internalists treat science as an autonomous pursuit, the significance of which is self-evident; externalists, believing this insufficient, seek to relate it to its sociocultural context. The latter may have a rather hazy comprehension of science per se—especially in its enigmatic 20th-century guises—and sometimes are constrained to focus on its institutional superstructure rather than its essence. As for the internalists (who predominate), most tend to be more conversant with that essence than with history broadly construed. The result is that most history of science—if it makes sense at all to laymen—seems so disembodied that it becomes a crashing bore. Thus an area of inquiry which ought to be central to contemporary studies in the liberal arts remains exiled to the nether lands of queer and esoteric subdisciplines.

Yet the field is not without a handful of able practitioners who are at home with science itself, sensitive to matters of perspective—and readable. J. G. Crowther is one of them, and at its best this elegant book about the Cavendish Laboratory at Cambridge University captures both the intrinsic excitement of scientific discovery and the complex interplay between science and society.

Crowther's knowledge of British science is probably unique. As a case in point, he first visited the Cavendish in 1917 at the age of 18, and has been a witness to virtually every major achievement registered there since. A large meas-

ure of this book's success is attributable to Crowther's personal acquaintance with the giants of modern physical science who worked at the Cavendish, from Ernest Rutherford, the grandsire of nuclear physics, to J. D. Watson, who helped unravel the secret of DNA. (Fully a score of other Nobel laureates were Cavendish men, an astounding total.) Beyond that, however, it comes off well because Crowther frequently takes us outdoors, as it were. Rather than merely cataloguing this "breakthrough" and that "triumph," he has tried throughout to explain what it all meant in broad setting—in terms of history.

The key figure in the establishment of the Cavendish was the brilliant Scottish physicist James Clerk Maxwell. Shortly after Maxwell and others had persuaded the university to institute a professorship in the rapidly evolving new sciences of electromagnetism and thermodynamics, the chancellor, the Seventh Duke of Devonshire (William Cavendish), offered to finance a physical laboratory. Maxwell was put in charge, and in the few years before his death in 1879 he largely shaped its intellectual dimensions: It became the first physics lab devoted primarily to original research, and eventually it ranked as the world's most illustrious center for experimental physics.

By its centenary, when it finally escaped its unbelievably cramped old quarters and relocated in West Cambridge, this supereminence had been eclipsed. Yet it remains an institution of signal importance. The Cavendish began in a building that cost less than £10,000, with one professor and a handful of assistants. The new Cavendish cost more than £4,000,000 and accommodates 700 workers. While there may be more salient examples of the "Little Science-Big Science" phenomenon of recent times, I know of no pertinent institutional study so well presented as this. Besides, Crowther is a wonderful storyteller. Let one example suffice: A strong sense of camaraderie once existed at the Cavendish—even though Englishmen were often in a minority—and the researchers instituted various social affairs such as an annual dinner. A highlight of this became the debut of new verses to popular tunes. One such was *Ions Mine*, sung to that most American of refrains, *Clementine:*

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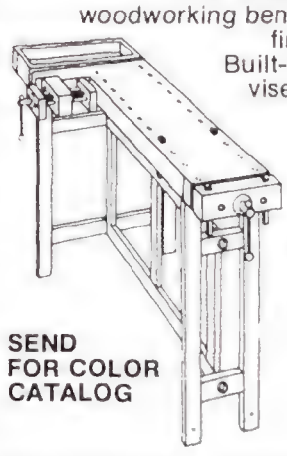

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—Robert C. Post
Historian, National Museum of History and Technology

The Joys of Beekeeping
Richard Taylor
(St. Martin's Press, $8.95)

Many of us believe we could live happily enough without beehives in the backyard, and in this we differ widely from Richard Taylor who says plainly that "without bees my own existence would be a shadowy thing, like a world without flowers or without stars. . . ."

And unless we are warned that *The Joys of Beekeeping* is a brief delight (brief ones are best), we may pass the volume by and regret it, for as Proust warned us—though he did not keep bees, actually—we rightly regret those joys we never experienced.

Taylor is an academic who has taught at Columbia, Swarthmore, Brown, Hamilton and so on. English language does not baffle him, for learning can be a means of grace and need not be an impediment if the eyes are fresh.

We would err if we turned to Taylor for detailed guidance—though his method of feeding new bees before the fruit trees start their honey flow is there—and he has no tips or pointers for us on loosening propolis, that marvelous varnish the bees make and use to seal cracks and which may be thought of as a sort of organic epoxy. The reader who wishes to raise bees, and certainly there are less wholesome desires abroad in our republic nowadays, will find instruction in many ordinary books or in journals such as *Gleanings in Bee Culture*, to which Taylor contributes regularly.

But it is the broader view and the loftier aim that must concern us here.

He justifies, you might say, the ways of bees to bears.

Books on bees commonly tell how to produce honey, "but they neglect to note how beautiful it is," as the author so rightly expresses it. There are books abounding to tell us how we can do everything ourselves, whether it be to paint the ceiling or construct a Walker tank in the basement, how to raise a meconopsis

or how to lay a tile, and, as a reader once observed, of the making of books there is no end and some of them are indeed a weariness even to contemplate, much less to read.

But there has never been a glut, in any generation of mankind or in any tongue, of the particular sort of good book that is modest, factual, sweet, profound and merry. In 166 pages, with some charming line drawings too, one finds the whole works and days of a beekeeper complete with sunshine.

The Joys of Beekeeping does not deal in vaporous rhapsodies, which sustain nobody, although it does, of course, clearly and calmly point out the superiority of beekeeping to almost every other endeavor, human or divine. The talisman of its success, and of its grace, is that those who can barely distinguish a bee from a bird (and I once mistook some carpenter bees for hummingbirds myself) will find it full of interest.

Bees do not, the author assures us, really need those little alighting ramps at the entrance to the hive. There are invented reasons, not real reasons, for them. They answer some need of the owner of the hives, not some need of the bees, we are told. The book is packed with long-sifted firsthand observations, a rare kind of knowledge.

We learn that a swarm of bees is beautiful and awesome, not terrifying, and we may half believe it and progress from active alarm to reasonable caution.

The book rests, the author rests, on the surface of some sea of deep feeling. Not everything is said. There is a resonance throughout that sustains and amplifies the unpretentious style, much as peach trees bloom with the full authority of roots that are not even seen.

The small and epicurean animals of the beehive are not like mankind, yet a man may learn especially his own role. That role, the author assures us, is not to lord it, not to conquer it, not to defy it, but to cherish life and sustain it, as a hen with chicks, or a god with men, or a beekeeper with his bees.

"What god," Virgil demands to know in the inscription before the preface, "disclosed to us this art?"

It is sweetly clear in this fresh clean book that the author, through bees or some other ways, has learned it.

—Henry Mitchell
Staff writer, *The Washington Post*

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Additional reading

Scythian gold (p. 28)

From the Land of the Scythians: Ancient Treasures from the Museums of the USSR, 3000 B.C. to 100 B.C. (exhibition catalog, Metropolitan Museum of Art, New York City)

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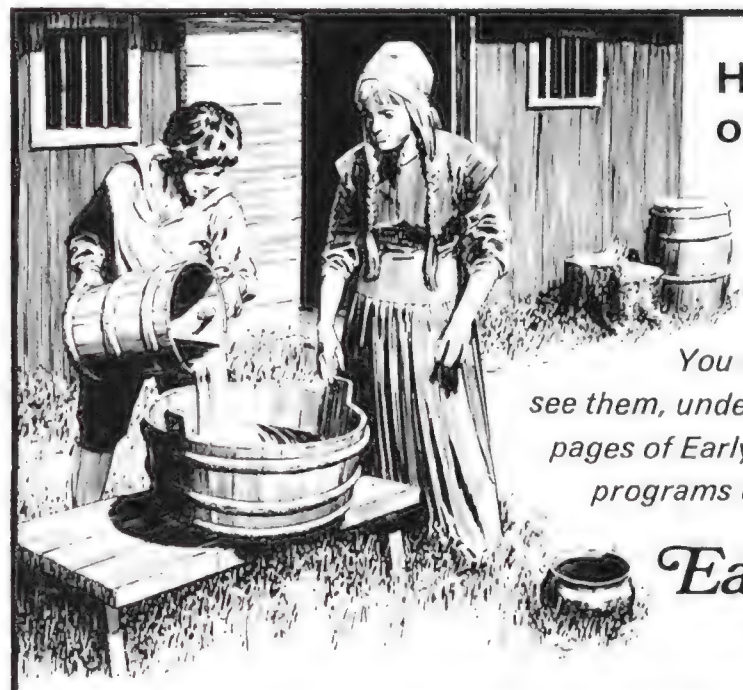

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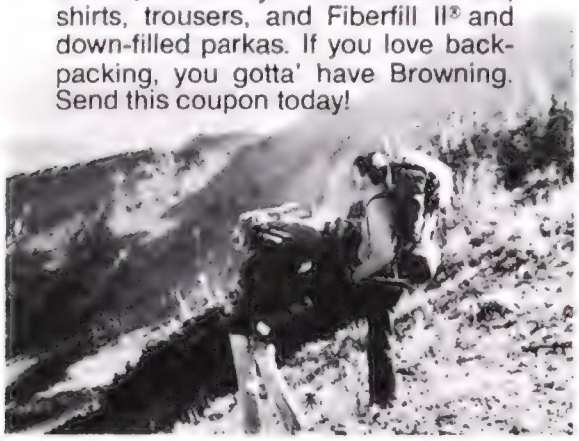

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Smithsonian highlights

National Portrait Gallery

The Gallery's second major Bicentennial exhibition, "The Dye Is Now Cast: The Road to American Independence, 1774-1776," is a chronicle of the two crucial years leading to the signing of the Declaration of Independence. The story of the years is interpreted through paintings, sculpture, documents, maps, prints and associative items installed in furnished settings that evoke the period. Among the major works are John Trumbull's painting, *The Death of General Warren at the Battle of Bunker's Hill,* Benjamin West's majestic painting of George III in armor and Charles Willson Peale's painting of George Washington with the victory at Yorktown in the background. The exhibition opens on April 19, the anniversary of the Battles of Lexington and Concord (see pp. 48-56), and continues through November 16.

Smithsonian Commons—Now Open on Weekends

As a result of its overwhelming popularity, the Smithsonian Commons is now open on weekends. Located in the original Castle building, the Commons offers a buffet luncheon entrée for a fixed price of $3.25, with a reduced rate for children. Beverages and desserts are optional. The Smithsonian Commons and the Associates Reception Center provide a place for Associates and their families to obtain information and lunch while visiting the national museums on the Mall. Hours are 11:15 A.M. to 2:15 P.M., seven days a week. An Associates' card is required.

Divisions of Performing Arts and Musical Instruments

The Smithsonian's Music from Marlboro series presents selections from Mozart and Beethoven—April 5, 5:30 P.M., Baird Auditorium, Museum of Natural History.

Randy Weston, an inventively original pianist and composer and an early follower of Thelonious Monk, is starred in the Hirshhorn series—April 6, 6 P.M., Hirshhorn Auditorium.

American Popular Song presents Bobby Short with memorable songs of the past—April 6, 8 P.M., Baird Auditorium.

The National Jazz Ensemble interprets the music of Armstrong, Ellington and Monk in the latest Jazz Heritage concert —April 13, 8 P.M., Baird Auditorium.

Man and His Culture series features the world-famous comedy troupe, Noh Kyogen National Theater of Japan—April 18, 8 P.M., Baird Auditorium.

American Popular Song presents Matt Dennis, composer of "Let's Get Away from It All" and "Angel Eyes"—April 20, 8 P.M., Baird Auditorium.

The Philidore Trio presents a concert of Baroque Music—April 26, 8:30 P.M., and afternoon workshops, April 25, 26 and 27, Baird Auditorium.

Jimmy Witherspoon, one of the originators of urban blues, sings his favorites in the American Popular Song series—April 27, 8 P.M., Baird Auditorium.

For additional program and ticket information, call (202) 381-5395.

Musical Weekend in Washington

The Smithsonian's fourth annual musical weekend, featuring concerts in settings from the Opera House of the Kennedy Center to the Sculpture Garden of the new Hirshhorn Museum, will be held May 2-4. A limited number of reservations are still available. Write to Musical Weekend, Museum of History and Technology, Room 4123, Smithsonian Institution, Washington, D.C. 20560.

Museum of Natural History

"Images from Nature" is a photographic exhibition of works by Warren Krupsaw.

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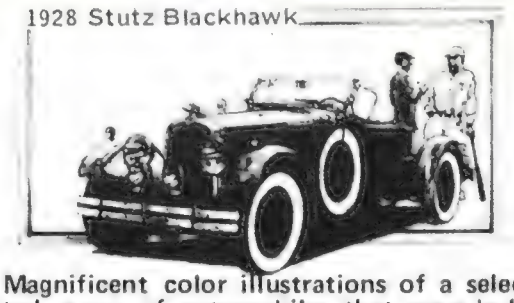

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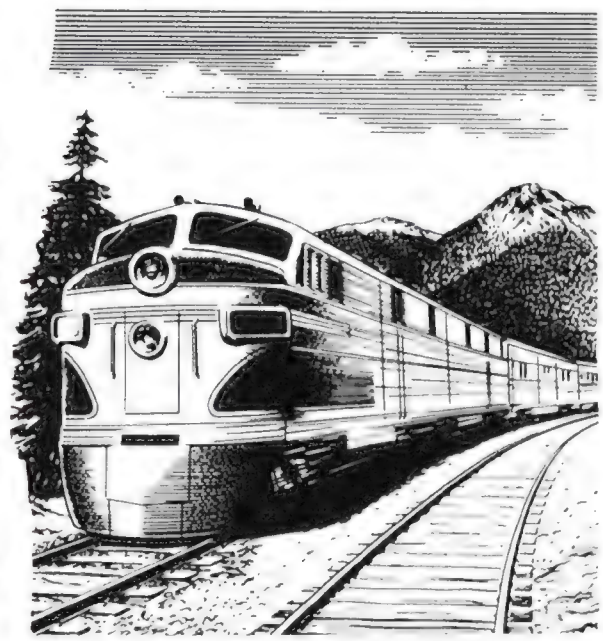

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"White Birches," photographed in 1969 in Canada's Laurentian National Park, is from new exhibit of works by Warren Krupsaw at the Natural History Museum.

The Trans-Alaska Pipeline.

A report on the most remarkable private construction project in American history.

Far above the Arctic Circle on Alaska's North Slope lies the largest oil field in North America. The Prudhoe Bay oil field holds an estimated 10 billion barrels (one barrel equals 42 gallons) of crude oil.

For years engineers have generally agreed that a pipeline would be the most economical way to get the oil out of this wilderness.

In 1974 work began on the Trans-Alaska Pipeline System—the largest single construction project ever undertaken by private industry.

It took over one-half million tons of steel to make the 798 miles of pipe for the project. The sections are 40' and 60' long, 48" in diameter.

The route

The Trans-Alaska Pipeline System will be about 798 miles long—winding its way from Prudhoe across the rugged face of Alaska to Valdez, a deep-water port in southern Alaska.

The Pipeline must cross 3 major mountain ranges, including the Brooks Range, where it will snake through Dietrich Pass at 4,500 feet

The 798-mile Trans-Alaska Pipeline System may ultimately carry 2 million barrels of oil a day from Prudhoe Bay to Valdez.

elevation. It will cross 17 major rivers, including the Yukon, third largest in North America.

At the southern terminal point in Valdez, the oil will be loaded into ocean-going tankers and shipped to the U.S. West Coast.

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Working conditions along the route are almost without parallel in the history of the industry. 40-mile-an-hour winds and temperatures down to 80° below zero can reduce human work efficiency by 90 percent.

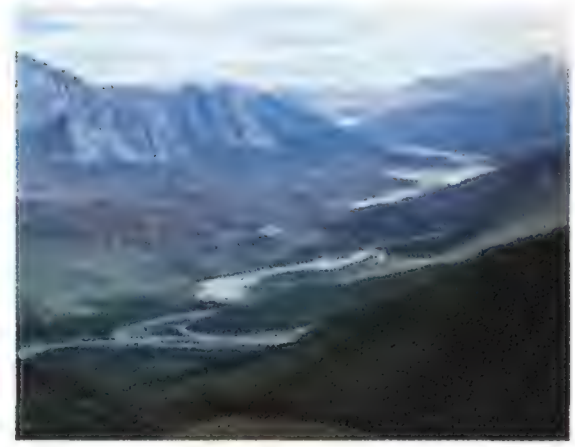
27 Empire State Buildings

It will take over three years and nearly $6 *billion* to build the Pipeline. This is the equivalent of what it would cost today to build 27 Empire State Buildings, or 3 Panama Canals.

Ownership of the Pipeline is held by eight companies, with Exxon Pipeline Co. having a 20 percent interest. These companies formed *Alyeska Pipeline Service Co.* to design and construct the Pipeline.

What's happening today

Right now, thousands of men and women are working on the Pipeline at many different camps spaced along the route. Employment will reach a peak of 15,000 workers at 29 camps.



The highest hurdle for the Pipeline will be the 4,500-foot-high Dietrich Pass in the Brooks Mountain Range.

The present schedule calls for the Pipeline operation to begin in the summer of 1977 at 600,000 barrels a day, with capacity of 1.2 million barrels a day shortly thereafter. Ultimately, the pipe may carry 2 million barrels a day. This important new source of oil will help America become more self-sufficient and less dependent on foreign oil.

For additional information on the Trans-Alaska Pipeline System, write: Exxon Corp., Dept. K, Box 1147, Ansonia Station, N.Y., N.Y. 10023.

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"High School Graphics IV" presents woodcuts, silk screens, etchings, monoprints and other graphic forms, selected from the fourth biennial print contest among Washington high school artists—opens April 11.

Renwick Gallery
"A Modern Consciousness: D.J. De Pree and Florence Knoll" honors two individuals who helped shape the course of modern furniture design and its international acceptance. The exhibition reviews, in chronological groupings, some of the major pieces of furniture by American designers associated with two major furniture companies, Herman Miller Incorporated and Knoll International. De Pree and Knoll were the companies' visionaries and were highly responsible for their success—opens April 11.

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The Smithsonian Commons, private Staff and Associates Dining Room, an elegant hall in the Smithsonian Castle, will now be open on Weekends: Saturday and Sunday, midday. To make your visit to the Smithsonian both appetizing and efficient, visit the Commons, weekends, 11:15 to 2:15. See Highlights, page 114 for details.

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Traveling Exhibition Service
There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Denver, Colorado—"Blacks in the Westward Movement" (May D & F, April 5-May 4).
- Newark, Delaware—"Mary Bruce Sharon: An American Primitive" (University of Delaware, April 5-May 4).
- Davenport, Iowa—"Manuscripts of the American Revolution" (Davenport Museum, March 29-April 27).
- St. Louis, Missouri—"The Five Sense Store" (Junior League of St. Louis, April 5-May 18).
- Nashville, Tennessee—"Black Presence in the Era of the American Revolution" and "In the Minds and Hearts of the People" (Tennessee American Revolution Bicentennial Commission, April 19-May 18).
- Charleston, West Virginia—"Antwerp's Golden Age" (Charleston Art Gallery of Sunrise, April 12-May 25).
- Grantham, Pennsylvania — "Victorian Needlework" (Messiah College, March 29-April 27).

Parking on the Mall
Metro construction has made all parking on the Mall extremely difficult. For up-to-date information on alternate parking areas and public transportation, write the Associates Reception Center, Smithsonian Institution, Washington, D.C. 20560.

Spring Museum Hours
Beginning April 1, most Smithsonian museum buildings are open daily from 10 A.M. to 9 P.M. The National Zoological Park is open daily from 9 A.M. to 6 P.M. and the Hirshhorn Museum and Sculpture Garden is open from 10 A.M. to 5:30 P.M. For general information, call the Reception Center, (202) 381-6264.

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By Patrick Ryan

Less is more, or so I'm trying to persuade myself

It may be timely to lighten financial despair with literary philosophy. Sweet, as the Duke Senior remarked in the forest of Arden, are the uses of adversity; and since we're currently thigh-deep in such ill circumstance, some comfort may be found in contemplation of whether his aphorism may not be applicable today.

The comparative privations brought upon the Western world by the simple business acumen of the oil sheiks and the natural desire of emergent nations to eat more of their own produce just may be evolutionary blessings in disguise. As our physical and gastronomic comforts decline, so may our ascendancy be extended in time. The early Roman Empire went finally down the drain because a surfeit of hot baths and central heating bred in them a civilized distaste for sleeping out on cold battlefields, and thus weakened the imperial defenses against hardier and hairier barbarians.

The oil shortage may have come just in time to prevent our becoming similarly effete. The continuing multiplication of gasoline prices will cut down the distances we can afford to travel in motor cars, thus reducing pollution and reintroducing the lost concept that these boots were made for walking. Owing to its heavy fuel consumption, the manufacturers are de-emphasizing the big car and Americans will no longer feel obligated to waste money on metal dinosaurs because their mechanized culture falsely judges a man's social status by the length of his automobile.

Because the faster you travel the hungrier becomes your conveyance, the great god Speed will go into the descendant (although it hasn't really so far) and there will be a cessation in the current spread of gadarene hysteria. What does it profit a man to circle the globe in a matter of hours, and bring back in reward nothing but thromboses, insomnia, ulcers and galloping hell on his circadian rhythms? Automobiles eventually will have to slow down by law, thereby running over fewer people and bringing reduction in the present motoring massacre (an estimated 46,000 human beings were killed and 1.8 million seriously injured in the United States last year).

Adversity, said Josh Billings, has the same effect on a man that severe training has on a pugilist—it reduces him to his fighting weight. And the particular adversity of soaring food prices may be of similar benefit to his wife. The majority of Western women seem obsessed with losing weight and spend small fortunes on variegated slimming processes, all the way down from health farms to self-imposed malnutrition. But, sadly, appetite too often overcomes willpower and the rubber tires and double chins remain stubbornly in situ. But now, here comes Fate to give a slenderizing hand to all.

The return of sugar to the class of luxury food only for the affluent will be one of our most blessed dietary deprivations. Overconsumption of sugar is blamed by one leading British nutritionist as being a causative factor in coronary thrombosis. In 1736, sugar was so rare and costly that it was listed with the precious stones among the wedding gifts of Maria Theresa, future Queen of Hungary. In 1760 per capita consumption of the dulcifying crystals in Britain was only five pounds a year. In 1973 it was up to 116 pounds in Britain and 106 pounds in the United States. The enforced cutback in this massive sweet ingestion should at least help our kids to keep their teeth until they reach puberty.

An economic necessity to cut back on cigarette consumption may cause some distress to the immediate relatives and working colleagues while withdrawal symptoms abrade the temper of the individual nicotine martyr; but for the community at large it can only make some contribution to a cutback in lung cancer.

Millionaire tycoons are wont to muse publicly about how happy they would be to lay down their burdens of commercial responsibility and swap places with the simple, happy, hard-working peasant. O.K. then, buster, now's your chance. The truly rich men of tomorrow may well be we sweating delvers with a back-breaking vegetable patch, life-dominating milk cow, homemade white lightning still, and a do-it-yourself methane plant in the backyard fed from the outdoor privy. And the transparent gentleman at the back of the auditorium, applauding vociferously, is Henry David Thoreau.

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